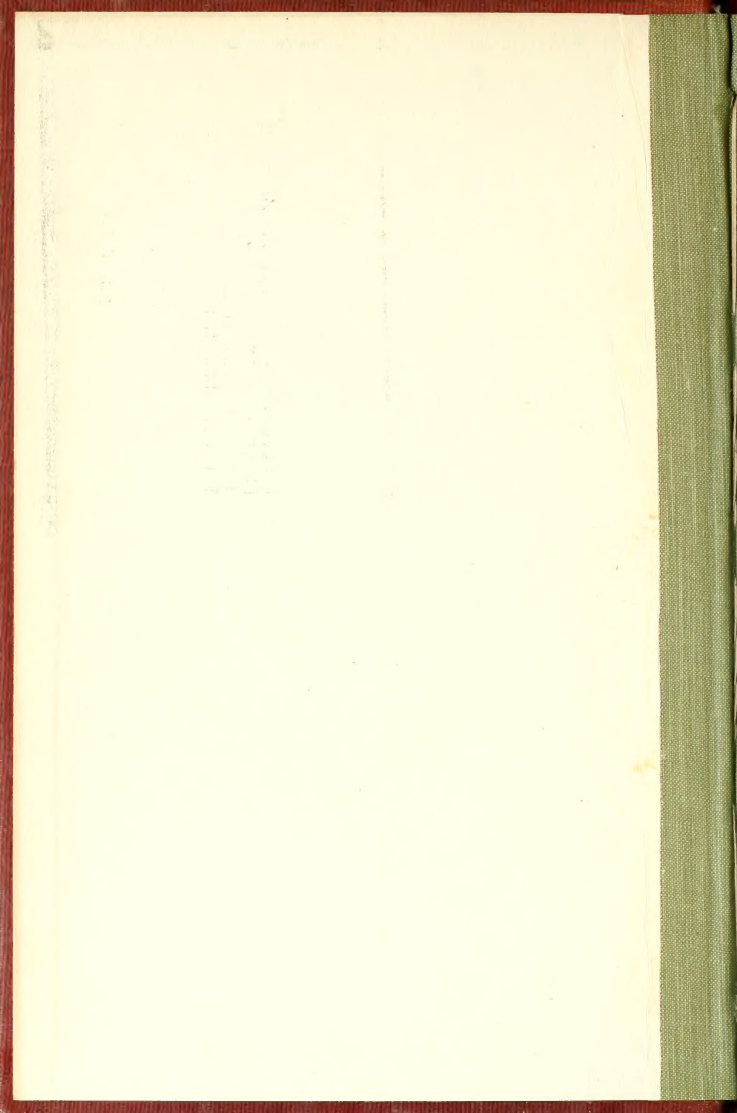


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CONTENTS OF VOLUME II

	PAGE
Title-page	i
Contents	iii
Dates of Publication	iv
List of Illustrations	iv
No. 1. Long Island Fauna and Flora—I. The Bats (Order Chiroptera); by Robert Cushman Murphy and John Treadwell Nichols	I
No. 2. Long Island Fauna and Flora—II. A Long Island <i>Acmea</i> and a New Variety of <i>Urosalpinx Cinerea</i> ; by Silas C. Wheat. Pl. I	17
No. 3. Long Island Fauna and Flora—III. The Frogs and Toads (Order Salientia); by Frank Overton. Pls. II—XIII.....	21
No. 4. A Report on the South Georgia Expedition; edited by Robert Cushman Murphy. Pls. XIV—XVIII. Introduction; by Robert Cushman Murphy	43
Plants collected on the South Georgia Expedition; by Norman Taylor	60
<i>Anasterias Octoradiata</i> , Nouvelle Astérie de la Georgie du Sud; by R. Koehler. Pl. XIV.....	64
Mollusca from South Georgia; by Wm. H. Dall.....	69
The Male of <i>Pandarus Satyrus</i> ; by Charles B. Wilson. Pl. XV.....	71
Amphipods of the South Georgia Expedition; by Clarence R. Shoemaker	73
Arachnida from South Georgia; by Nathan Banks.....	78
Mallophaga from Birds of the South Atlantic; by Vernon L. Kellogg. Pl. XVI.....	80
Collembola, Siphonaptera, Diptera and Coleoptera of the South Georgia Expedition; by Charles Schaeffer.....	90
Anatomical Notes on the Young of <i>Phalacrocorax Atriceps Georgianus</i> ; by R. W. Shufeldt. Pls. XVII, XVIII.....	95
No. 5. The Penguins of South Georgia; by Robert Cushman Murphy. Pls. XIX—XLIII.....	103
No. 6. A Contribution to the Ornithology of the Orinoco Region; by George K. Cherrie	133a

DATES OF PUBLICATION OF VOLUME II

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Number 5.....	August 2, 1915
Number 6.....	September 1, 1916

LIST OF ILLUSTRATIONS

PLATES

No.		FACING PAGE
I.	<i>Acmea fergusonia</i> Wheat	17
II.	<i>Bufo fowleri</i> ; Fig. 2. Male singing; Fig. 3. Common toads paired	40
III.	<i>Bufo fowleri</i> ; Figs. 4, 5, 6. Eggstrings, tadpoles, and young imagos; Figs. 7-11. Photographs of five male toads	40
IV.	Fig. 12. A favorite breeding pool of <i>Bufo fowleri</i> , Patchogue, L. I.; Fig. 13. A male of <i>Bufo americanus</i>	40
V.	<i>Scaphiopus holbrooki</i> ; Fig. 14. Portrait of a spadefoot toad; Fig. 15. A mated pair	40
VI.	<i>Scaphiopus holbrooki</i> ; Fig. 16. Pool at Patchogue, L. I., where spadefoots were first observed; Fig. 17. A spadefoot; Fig. 18. Eggstring of spadefoot toad, photographed under water; Fig. 19. A spadefoot calling in response to the stimulus of being tickled; Figs. 20-22. Male spadefoots "squaking" in the water	40
VII.	Figs. 23-25. <i>Acris gryllus crepitans</i> —three songsters; Figs. 26-27. <i>Hyla versicolor</i> —three frogs thrilling; Fig. 28. A spring peeper (<i>Hyla pickeringi</i>); Fig. 29. The same with throat and body distended in song; Figs. 30-32. <i>Hyla pickeringi</i>	40
VIII.	Fig. 33. Pickerel frog (<i>Rana palustris</i>) "snoring"; Fig. 34. Leopard frog (<i>Rana pipiens</i>) with paired vocal sacs distended in song	40

IX.	<i>Rana pipiens</i> ; Fig. 35. Leopard frog with sacs inflated and (Fig. 36) with sacs collapsed and body extended at the expiration of the song; Figs. 37, 38. Leopard frogs, at rest and singing.....	40
X.	<i>Rana sylvatica</i> ; Fig. 39. Wood frog; Fig. 40. Breeding place of wood frogs, Patchogue, L. I. Figs. 41, 42. Wood frogs swimming.....	40
XI.	Fig. 43. Egg mass of wood frog (<i>Rana sylvatica</i>); Fig. 44. Green frog (<i>Rana clamitans</i>) singing with swollen "cheeks"; Fig. 45. A green frog (<i>Rana clamitans</i>)	40
XII.	Fig. 46. Green frog (<i>Rana clamitans</i>) singing; Fig. 47. Bull frog (<i>Rana catesbiana</i>) calling.....	40
XIII.	<i>Rana catesbiana</i> ; Fig. 48. Head of bull frog; Fig. 49. Bull frog in the act of bellowing	40
XIV.	Dorsal and ventral view of <i>Anasterias octoradiata</i> and details	68
XV.	Dorsal view of male of <i>Pandarus satyrus</i> and details..	72
XVI.	Mallophaga from birds of the South Atlantic.....	80
XVII.	Fig. 1. Right lateral view of a spirit specimen of the young of <i>Phalacrocorax atriceps georgianus</i> ; Fig. 2. Same specimen with the common integuments removed	102
XVIII.	Anatomical details of the young of <i>Phalacrocorax atriceps georgianus</i>	102
XIX.	<i>Pygoscelis papua</i>	103
XX.	Three views of Lucas Glacier colony of king penguins.	106
XXI.	Incubating king penguins	103
XXII.	Figs. 1, 2. Two views of incubating king penguins; Fig. 3. King penguin	103
XXIII.	Fig. 1. Group of sitters of king penguins at the Lucas Glacier colony; Fig. 2. Birds of the same group quarreling	108
XXIV.	Fig. 1. King penguins battling; Fig. 2. A courting pair	108
XXV.	Yearling king penguin	110
XXVI.	Fig. 1. Two young king penguins; Fig. 2. Yearling male king penguin in the molt.....	110
XXVII.	Fig. 1. Molting king penguins; Fig. 2. Stages of the molt	110
XXVIII.	Fig. 1. Adult king penguin; Fig. 2. A frightened bird "tobogganing"	112

XXIX.	Fig. 1. "Bachelor" kings aroused from a noon-day nap; Fig. 2. The same band marching toward the bay	112
XXX.	Fig. 1. King penguin entering the Bay of Isles; Fig. 2. Taking to the water	112
XXXI.	King penguin coming ashore	112
XXXII.	Johnny penguins; Figs. 1, 2. Sunning themselves on the beach of Cumberland Bay; Fig. 3. Walking up to the camera	114
XXXIII.	Fig. 1. Summit of the large <i>Pygoscelis</i> colony; Fig. 2. <i>Pygoscelis</i> colony near Nordenskjöld Glacier	116
XXXIV.	The long road to the hilltops <i>Pygoscelis</i> colony	118
XXXV.	Fig. 1. Sea leopard (<i>Hydrurga</i>), yawning in contented leisure on the floe ice in front of Grace Glacier; Fig. 2. Johnny penguin in the graveyard pool, Bay of Isles, rolling its back above the surface	120
XXXVI.	Fig. 1. An unusually bulky nest of the Johnny penguin; Fig. 2. Johnny penguin on its nest	122
XXXVII.	Fig. 1. Johnny penguin rising suspiciously from the nest; Fig. 2. The "brood patch" which the bird has spread as it is about to settle on the eggs	126
XXXVIII.	Fig. 1. About to "relieve guard," Fig. 2. Johnnies setting their flippers as balancers, and starting toward the sea	128
XXXIX.	Fig. 1. Parent with one egg and one newly-hatched young; Fig. 2. Nestmates, collected at the Bay of Isles	130
XL.	Fig. 1. Parent with two half-grown, potbellied nestlings; Fig. 2. Parent with one youngster, which has left the nest	132
XLI.	Fig. 1. Young Johnny penguin at the beginning of the post-juvenal molt; Fig. 2. Downy young, under guard of adult nurses	134
XLII.	Fig. 1. Three frightened youngsters running at top speed; Fig. 2. Well grown young	134
XLIII.	Fig. 1. Downy young, adult nurses, and moulting adults; Fig. 2. Johnny penguins swimming on the surface of a fresh water pond	134

TEXT FIGURES

I.	Spadefoot toad in the act of spawning	39
	The brig "Daisy" of New Bedford	43
	View from the shore of Moraine Fjord, Cumberland Bay	44

The "Daisy" in King Edward Cove, Cumberland Bay.....	45
Nordenskjöld Glacier, Cumberland Bay.....	46
Looking Eastward over the Bay of Isles.....	49
Grace Glacier, Bay of Isles.....	52
The boat landing cove and the eastern portion of the Bay of Isles.	53
Observatory of the Oficina Meteorologica Argentina, King Edward Cove, Cumberland Bay.....	54
<i>Notiomasa australis</i> gen. et sp. nov.	79
Penguin colonies at this Bay of Isles, South Georgia.....	106
2. <i>a.</i> King penguin trumpeting; <i>c.</i> Posing after trumpeting.....	111
3. <i>c.</i> Descending a bank. <i>c.</i> Wading into the water.....	125
4. Tongue and divided trachea of <i>Pygoscelis papua</i>	132

INDEX TO VOLUME II.

New names of genera, species and subspecies are printed in **heavy-faced type**; also the most important reference of a series of references.

Synonyms are printed in *italics*.

- Abranchus
 - brunneus, 51
- Acaena
 - adscendens, 61, 63
- Accipiter
 - bicolor
 - bicolor, 341
 - tinus, 342
- Acmaea
 - fergusoni, 17
 - testudinalis, 18, 19, 20
- Acris
 - gryllus, 25, 26, 30, 40
 - crepitans, 25, 26, 30, 40
- Actitis
 - macularia, 371
- Actoceles
 - abscondita, 92
 - georgiana, 92
- Acuan
 - virgatum, 63
- Aegialitis
 - collaris, 370
 - semipalmata, 370
- Agamia
 - agami, 363
- Agelaeus
 - icterocephalus, 209
- Aglaiia
 - paradisea, 172
- Agyrtria
 - albiventris, 295
 - chionopectus
 - chionopectus, 296
 - whitelyi, 296
 - fimbriata, 295
 - milleri, 296
- Ajaia
 - ajaja, 360
- Alcedinidae, 326
- Alcedinidae, key to the genera, species and subspecies of, 326
- Alcedo
 - aenea, 326
 - amazona, 327
 - americana, 327
 - aureus, 325
 - dea, 324
 - galbula, 325
 - inda, 326
 - torquata, 326
- Alopocheleon
 - fucata, 159
- Alopochen
 - jubatus, 373
- Amazilia
 - cupreicauda, 296
- Amazona
 - amazonica, 329, 334
 - bodini, 329, 333
 - inornata, 329, 333
 - ochrocephala, 329, 333
- Ampelis
 - cinerea, 254
 - hypopyrrha, 250
- Amphipods of the South Georgia Expedition, by Clarence R. Shoemaker, 73
- Anabates
 - pyrrhodes, 263
 - ruficaudus, 263
 - turdinus, 263
- Anaplops
 - rufigula
 - pallidus, 275, 291
 - rufigula, 291
- Anas
 - brasiliensis, 373
 - moschata, 372
- Anatidae, 372
- Anasterias, 64, 65
 - octoradiata, 64, 67, 68
 - tenera, 66, 67, 68
- Anasterias octoradiata, nouvelle astérie

- de la Géorgie du Sud; par R. Koehler, 64
- Ancistrona*
gigas, 80
procellariæ, 89
- Anhima*
cornuta, 366
- Anhinga*
anhinga, 366
- Anonyx*
zschaui, 73
- Antarctomysis*
maxima, 52, 120
- Anthoscenus*
longirostris
longirostris, 299
- Anthracothonax*
gramineus, 298
nigricollis, 298
- Antenor*
unicinctus, 342
- Antrops*
truncipennis, 92
- Anser*
jubatus, 373
- Apherusa*
georgiana, 73, 75
- Aptenodytes*, 116, 132
forsteri, 107
patachonica, 133
- Ara*
ararauna, 329, 330
chloroptera, 329, 330
macao, 329
severa, 329, 330
- Aramidae*, 367
- Aramides*
cajanea, 367
cayennensis, 367
- Aramus*
scolopaceus, 367, 368
- Arachnida from South Georgia, by Nathan Banks, 78
- Aratinga*
chrysophrys, 329, 331
hemorrhoea, 329, 331
leucophthalmus, 329, 331
melanurus, 331
- Ardea*
agami, 363
cærulea, 363
candissima, 363
- Ardea*
cocoi, 362
egretta, 363
helias, 368
lineatum, 366
maguari, 369
naevia, 364
pileata, 364
pumila, 366
sibilatrix, 365
scolopacea, 367
striata, 365
violacea, 364
- Ardeidae*, 362
- Argicus*
macroductylus
caurensis, 320
chapmani, 319
- Arremon*, 185
silens, 107
- Arremonops*, 185
conirostris
venezuelensis, 197
- Arundinicola*
leucocephala, 214, 217
- Ascaris*
osculata, 51
simplex, 51
- Astragalinus*
psaltria
columbianus, 185, 191
- Asturina*
magnirostris, 342
nitida, 344
- Atalotriccus*
pilaris
venezuelensis, 214, 223
- Ateleodacnis*
analís, 164
bicolor, 164
- Atticora*
fasciata, 150, 162
melanoleuca, 161
- Attila*
uropygialis, 255
wighti, 251
- Atylodes*
australis, 75
furcipes, 73
magellanica, 75
- Atylus*
antarcticus, 74

- Automolus*, 257
 infuscatus
 cervicalis, 257, 263
 turdinus, 257, 263
 sclateri, 263
- Banks*, Nathan
 Arachnida from South Georgia, 78
- Basileuterus*
 auricapillus
 olivaceus, 151, 153
 mesoleucus, 151, 153
- Bedella*
 symmetrica, 78
- Belonopterus*
 cayennensis, 370
- Bibliography of the Amphipods of South Georgia, 76
- Bibliography of the South Georgia expedition, 50
- Bovallia*
 gigantea, 73
 monoculoides, 73, 74
- Brachygalba*
 lugubris, 324, 325
- Brachyspiza*
 capensis, 195
- Brotogeris*
 chrysopterus, 329, 332
 devillei, 329, 332
- Bubo*
 clamator, 349
 virginianus
 scotinus, 350
- Bubonidæ*, 349
- Bucco*
 bicinctus, 321
 capensis, 320
 dysoni, 320
 macrodactylus, 320
 tamatia, 320, 321
 tectus, 320
- Bucconidæ*, 319
- Bucconidæ*, key to the genera, species and subspecies of, 319
- Buellia*
 saxatilis, 63
- Bufo*
 americanus, 27
 fowleri, 25, 26, 27, 40
- Bufonidæ*, 25
- Busarellus*
 nigricollis, 343
- Buteogellus*
 æquinoctialis, 344
- Butorides*
 cyanurus, 365
 striata, 365
- Cacicus*
 cela, 202, 204
 hæmorrhous, 202
 hæmorrhous, 205
- Cairina*
 moschata, 372
- Calliopius*
 georgianus, 73
- Calliphlox*
 amethystina, 299
- Callitriche*
 antarctica, 61
- Calliste*
 cayana, 172
 paradisea, 172
 vieilloti, 174
 xanthogastra, 172
- Caloplaca*
 callopisma, 63
 murorum
 major, 63
- Campylopterus*
 largipennis, 294
- Campylorhamphus*
 trochilirostris, 265, 269
- Campylorhynchus*
 griseus, 143
 nuchalis, 146
- Campephilus*
 melanoleucus, 308
- Cancroma*
 cochlearia, 364
- Capito*
 auratus
 aurantiicinctus, 316
 intermedius, 316
- Capitonidæ*, 316
- Caprimulgidæ*, 300
- Caprimulgus*
 acutipennis, 302
 albicollis, 301
 cayennensis, 300
 leucopygus, 303
 nacunda, 303

- Caprimulgus
 nigrescens, 302
 Capsiempis
 caudata, 224
 flaveola, 215, 226
 Cariothraustes
 canadensis
 canadensis, 186
 Cassicus
 albirostris, 204
 hæmorrhous, 205
 yuracares, 203
 persicus, 204
 Cassidinopsis
 emarginata, 53
 Cassidix
 oryzivora
 oryzivora, 202, 210
 Catharma
 orthura, 299
 Catharista
 urubu
 brasiliensis, 339
 Cathartes
 atratus, 339
 aura
 pernigra, 336
 brasiliensis, 309
 burovianus, 336, 338
 pernigra, 336
 urobitinga, 338
 Cathartidæ, 335
 Catharus
 birchalli, 135
 Celetus
 elegans
 hellmayri, 305, 307
 reichenbachii, 307
 humana, 305, 307
 grammicus, 307
 Centurus
 subelegans, 304, 305
 terricolor, 304, 305
 Ceophloeus
 lineatus, 304, 309
 Cephalopterus
 ornatus, 250, 256
 Ceratixodes
 putus, 78
 Cerchneipicus
 torquatus, 305, 308
 Cerchneis
 sparverius
 isabellinus, 347
 Cercibis
 oxycerca, 361
 Cercomacra
 cinerascens, 274, 286
 napensis, 286
 nigricans, 274, 287
 tyrannina, 274
 tyrannina, 287
 Certhia
 cærulea, 164
 cinnamomea, 259
 cyanea, 164
 Certhiola
 guianensis, 167
 luteola, 165, 167
 Ceryle
 americana, 327
 inda, 326
 superciliosa, 326
 torquata, 326
 Chæmepelia
 minuta, 354
 passerina
 granatina, 353
 rufipennis
 rufipennis, 353
 Chætura
 andrei, 304
 spinicauda, 304
 Charadriidæ, 369
 Charadrius
 bistriatus, 368
 cayanus, 370
 collaris, 370
 mexicanus, 371
 semipalmatus, 370
 squatarola, 83
 Chelidoptera
 tenebrosa, 320, 322
 Cherrie, George K.
 A Contribution to the Ornithology
 of the Orinoco region, 133
 Chlorestes
 cæruleus, 297
 Chlorimerium
 antarcticum, 94
 Chloroceryle
 anca
 anca, 326

- Chloroceryle amazona*, 326, 327
americana
americana, 326, 327
inda, 326
- Chloronerpes*
flavigula, 304, 305
rubiginosus, 304
- Chlorophanes*
spiza
spiza, 163, 164
- Chlorostilbon*
caribæus
nanus, 297
- Chordeiles*
acutipennis
acutipennis, 302
pusillus, 302
- Chiromachaeris*
manacus, 249
- Chiroxiphia*
pareola, 247
- Chrysolampis*
elatus, 298
- Chrysomitris*
columbiana, 191
- Chrysoptilus*
punctigula
punctipectus, 304, 305
guttatus, 305
- Chrysotis*
bolini, 333
inornata, 333
- Ciconia*
mycteria, 369
- Ciconiidae*, 369
- Circus*
buffoni, 344
- Cirrhopipra*
filicauda, 247
- Cissopis*
leveriana, 168, 183
- Cladonia*
bellidiflora
subuliformis, 62
- Clanidota*, 69
- Claravis*
pretiosa, 354
- Claudia*
squamata, 303
- Cnipolegus*
orenocensis, 218
pusillus, 219
- Coccyzus*
americanus, 310
euleri, 310, 311
melacoryphus, 310, 311
pumilus, 312
- Cochlearius*
cochlearius, 364
- Cœreba*
guianensis, 164, 167
luteola, 164
luteola, 164, 165
hellmayri, 164, 166
nitida, 165
trinitatis, 166
- Cœrebidæ*, key to the genera, species and subspecies of, 163
- Cœrebidæ*, 165
- Columbigallina*
minuta, 354
passerina
granatina, 353
rufipennis, 353
- Columba*
minuta, 354
purpureotincta, 351
rufaxilla, 352
rutina, 351
speciosa, 350
- Colpocephalum*
subæquale, 89
- Collembola*, Siphonaptera, Diptera and Coleoptera of the South Georgia Expedition, by Charles Schaeffer, 90
- Colopteryx*
galeatus, 214, 223
pilaris, 223
- Cominella*
densicathrata, 67
- Compsothlypis*
pitiayumi
elegans, 151, 152
pitiayumi, 151
- Conopias*
inornatus, 214, 238
- Contribution to the Ornithology of the Orinoco region, by George K. Cherrie, 133a.
- Conurus*
cruginosus, 331
chrysophrys, 331

- Conurus*
 hæmorrhous, 331
Cooperaster
 bicolor, 341
Coracina
 orenocensis, 255
Coryphæna
 hippurus, 51, 52, 76
Coryphospingus, 185
 pileatus, 185, 201
Corvidæ, 212
 Corvidæ, key to the species of, 212
Corvus
 cayanus, 213
 corone, 89
Corythopis
 torquata
 anthoides, 293
Cotingidæ, key to the species and sub-species of, 250
Cracidæ, 355
Craspedoprion
 olivaceus
 guianensis, 235
 intermedius, 236
Crax
 alector, 356
 cumanensis, 357
 tomentosa, 355
Crocomorphus
 flavus, 305, 308
Crotophaga
 ani, 310, 315
 major, 310, 315
 sulcirostris, 310, 315
Crypturus
 cinereus, 360
 pileatus, 360
 soui
 soui, 360
 variegatus, 360
Cuculidæ, 309
Cuculus
 americanus, 310
 cayanus, 312
 melanogaster, 312
 nævius, 314
 niger, 322
 tenebrosus, 322
Cultrides
 rufipennis, 315
 Cumberland Bay, South Georgia, data from, 55
Cyamium
 antarcticum, 70
 mosthaffii, 70
Cyanerpes
 cærulea
 cærulea, 164
 cherriei, 164, 165
 cyanea
 cyanea, 163, 164
 nitida, 164, 165
Cyanocompsa
 rothschildi, 185, 186
Cyanocorax
 cayanus, 212, 213
 violaceus, 212
Cyclarhis
 guajanensis
 flavipectus, 158
Cymbilaimus
 lineatus
 lineatus, 271, 275
Cyphorhinus
 leucostictus, 147
Cypselus
 spinicaudus, 304
 squamatus, 303
Daenis
 angelica, 164
 bicolor, 165
 cayana
 cayana, 164, 165
 flaviventris, 164, 165
 Dall, Wm. H.
 Mollusca from South Georgia, 69
Daption
 capensis, 86, 89
Daptrius
 ater, 341
Dasycephala
 uropygialis, 255
Dendrocincta
 merula, 265, 270
 olivacea
 phæochroa, 265, 270
 meruloides
 phæochroa, 270
 phæochroa, 270
Dendrocolaptes
 albolineatus, 269

- Dendrocolaptes*
certhia, 265, 271
merula, 270
picrostris, 268
susurrans, 266
trochilirostris, 269
- Dentocolaptidæ*, key to the genera, species and subspecies of, 264
- Dendrocopus*
longirostris, 269
pardalotus, 267
- Dendrocornis*
guttata
guttatoides, 266
sororia, 266
lineatocapilla, 267
obsoleta
notata, 267
pardalotus, 267
rostrifallens
sororia, 266
susurrans
jardinei, 266
- Dendrocygna*
discolor, 373
- Dendroica*
festiva, 151, 153
striata, 151, 153
- Dendroplex*
picrostris, 265, 268
picus
picus, 265, 268
- Dicosura*
longicauda, 300
- Diglossa*
major, 163
- Diomedea*
albatrus, 85, 87
chlororhyncha, 86
exulans, 81, 85, 86
melanophrys, 85, 88
nigripes, 81
- Diopsittaca*
hahni, 329, 330
- Diplopterus*
nævus, 314
- Diplochelidon*, 158
- melanoleuca*, 159, 161
- Distomum*
ampullaceum, 51
- Djerboa*
furcipes, 75
- Docophorus*
armatus, 83
atlanticus, 81
atratus, 84
cephaloxus, 82
dentatus, 81
fuliginosus, 83
lari
laricola, 81
numenicola, 83
perspicuus, 83
pustulosus, 81
viridicola, 82
- Dolichonyx*
oryzivorus, 202
- Dolaspingus*
nuchalis, 185, 190
- Donacobius*
atricapillus
atricapillus, 142
- Dysithamnus*
affinis
andrei, 272, 281
ardesiacus, 280
ardesiacus, 272
saturinus, 272, 280
- Eatonia*
kerguelenensis, 69
- Eatoniella*
kerguelenensis, 69
- Egretta*
candidissima, 363
- Elanus*
leucurus, 345
- Elainea*
littoralis, 218
macilvaini, 230
pagana, 228
placens, 228
- Elaenia*
chiriquensis
chiriquensis, 228
chiriquensis, 228
cinerea, 230
cristata, 216, 229
martina
flavogastra, 215, 228
parvirostris, 229
viridicata, 229
delicata, 229

- Elainopsis
 gaimardii, 230
 Emberiza, 198
 americana, 198
 Emberizoides, 185
 macrourus, 197
 Empidochanes
 arenaceus, 216, 242
 Empidonax
 lawrencei, 243
 pilcatus, 243
 brachytarsus, 243
 Empidononax
 varius, 245
 Erator
 inquisitor
 erythrogenys, 250, 251
 Eretmoptera
 browni, 91, 92
 murphyi, 91, 92
 Erionotus
 cinereipes, 272, 276
 insignis, 272
 nævius
 nævius, 272, 276
 Eucinetus
 caica, 329, 335
 Eudocimus
 ruber, 362
 Eudypes, 115
 chrysophilus, 103, 130, 131
 Euphonia
 chlorotica, 100
 chrysopasta, 171
 melanura, 171
 rufiventris, 171
 trinitatis, 169
 violacea, 171
 Eupsychortyx
 sonnini, 357
 Eurymera
 monticulosa, 73, 74
 Eurymetopus
 taurus, 81, 87, 88
 murphyi, 87, 88
 pacificus, 87, 88
 Eurypyga
 ichas, 368
 Eurypygidae, 368
 Euscarthmus
 meloryphus, 286
 Eutyphis
 faba, 73, 75
 Euxenura
 maguari, 369
 Falco
 æquinoctialis, 344
 americanus, 341
 anthracina, 343
 buffoni, 344
 brachypterus, 344
 carolinensis, 348
 cayennensis, 346
 cheriway, 340
 columbarius, 348
 fusco-cærulescens, 347
 isabellinus, 347
 magistrostris, 342
 meridionalis, 343
 nigricollis, 343
 nitida, 344
 ornatus, 345
 uncinnatus, 345
 unicinctus, 342
 urubitinga, 343
 tinus, 342
 rufigularis, 348
 Falconiæ, 340
 Feronia
 spinifera, 93
 Festuca
 erecta, 60, 61, 63
 Floricola
 longirostris, 299
 Florida
 cærulea
 cærulea, 363
 Florisuga
 mellivora
 mellivora, 295
 Fluvicola
 pica, 214, 216
 Formicariidæ, key to genera, species and
 subspecies of, 271
 Formicarius
 atrothorax, 288
 colma, 292
 colma, 273, 292
 nigrifrons, 292
 glaucopectus, 292
 ruficeps, 273, 293
 torquatus, 291

- Formicivora**
 cano-fumosus, 285
 cinerascens, 286
 hæmatonota, 284
 intermedia, 285
 orenocensis, 285
Fregata
 ariel, 86, 93
Fringilla
 capensis, 195
 flaveola, 191
 gutturialis, 190
 macroura, 197
 manimbe, 196
 pileata, 201
 rubra, 179
 splendens, 190
 violacea, 171
Fringillidæ, 184
Fringillidæ, key to the genera, species
 and subspecies of, 184
Frogs and toads of Long Island, artifi-
 cial key to the, 26
Frogs and toads of Long Island, list of,
 25
Fulica
 cajanea, 367
Fulmarus
 glacialis, 85, 87
Furnariidæ, key to the genera, species
 and subspecies of, 257
Furnerarius
 griseus, 143
Galbula
 albirostris, 325
 galbula, 324, 325
 lugubris, 325
 ruficauda, 324, 325
Galbulidæ, 324
Galbulidæ, key to the genera, species
 and subspecies of, 324
Gallinago
 brasiliensis, 372
 paraguaiæ, 372
Gampsonyx
 swainsoni, 346
Geothlypis
 æquinoctialis, 151, 152
Geranoospizias
 cærulescens, 345
Ginglymostoma
 cirratum, 52
Glaucidium
 brasilianum
 phalænoides, 350
 jardinei, 350
Glaucis
 hirsuta
 hirsuta, 293
Globiocephalus
 brachypterus, 51
 p., 44
Glyphorhynchus
 cuneatus
 castelnaudi, 264, 266
 cuneatus, 264, 265
Goniopsyllus
 kerguelensis, 90
Gracula
 foetida, 256
Granatellus
 pelzelni, 151, 152
 pelzelni, 152
Guara
 rubra, 362
Guiraca
 rothschildi, 186
Gygis, 47
Gymnoderus
 foetidus, 250, 256
Gymnimystax
 mexicanus, 203, 208, 211
Gymnostinops
 yuracares
 caurensis, 203
Gypagus
 papa, 339
Gypopsitta
 vulturina, 329, 335
Habrura
 pectoralis
 brevipennis, 224
Hadrostomus
 minor, 251
Halacarus, 78
Halirytus
 amphibius, 91
Hapalocercus
 meloryphus, 274, 286
Harpiprion
 cayennensis, 361

- Heleodytes*, 142
 griseus, 142, 143, 145, 146, 147
 minor, 142, 145
 nuchalis, 142, 146
Heliothryx
 aurita, 299
Helodromas
 solitarius, 371
Hemithraupis
 flavicollis
 auricularis, 168, 182
Henicorhina
 leucosticta, 143, 147
Herodias
 egretta, 363
Herpetotheres
 cachinnans
 fulvescens, 345
 sociabilis, 346
Herpsilochmus
 argentatus, 287
 frater, 274
 sticturus
 nigrescens, 285
 sticturus, 273, 285
Heterocercus
 angosturæ, 250
 flavivertex, 247, 249
Heterocnemis
 argutata, 287
Heteropelma
 amazonum, 249
Heterospizias
 meridionalis, 343
Himantopus
 mexicanus, 371
Hirundinella
 clavata, 51
Hirundinidæ, 185
Hirundinidæ, key to the species and sub-species of, 159
Hirundo
 albiventer, 162
 chalybea, 160
 erythrogaster, 159
 fasciata, 162
 melanoleuca, 161
 subis, 159
 tapera, 160
Holoquiscalus
 lugubris, 202, 211
Haploxypterus
 cayanus, 370
Horizopus
 brachytarsus
 depressirostris, 243
Hydrocorax
 vigua, 367
Hydromedion
 sparsutum, 92, 94
Hyla
 pickeringi, 25, 26, 31, 33, 40
 versicolor, 25, 26, 32, 33, 40
Hylidæ, 25
Hylocharis
 cyanus
 viridiventris, 297
 saphyrina, 297
Hylocichla, 134
 aliciæ
 aliciæ, 135, 140
Hylophilus
 acuticauda, 156
 brunniceps, 157
 muscipapinus, 157
 semicinctus, 157
 thoracicus
 griseiventris, 156
Hylophylax
 nævia, 290
 nævia, 274, 290
 consobrina, 290
 pæcilinota
 lepidonota, 274, 289
 pæcilinota, 274, 289
 punctulata, 274, 290
Hypnelus
 bicinctus, 319, 321
Hypocnemis
 flavescens, 289
 flavescens, 273, 289
 humilis, 273, 289
 leucophrys, 290
 melanopogon, 291
 myiotherina
 myiotherina, 291
 pæcilinota
 pæcilinota, 289
 punctulata, 290
Hypolophus
 canadensis
 trinitatis, 272, 276
 intermedius, 277

- Hypotriorchis*
columbarius, 348
femoralis, 347
fuscocærulescens, 348
rufigularis, 348
- Ibicter*
americanus, 341
ater, 341
- Ibidæ*, 361
- Ibis*
oxycercus, 361
- Icteridæ*, 201
- Icteridæ*, key to the genera, species and subspecies of, 202
- Icterus*
auricapillus, 205
chrysocephalus, 205
icterus, 203, 207
tanagrinus
guianensis, 210
xanthornus
xanthornus, 203, 206, 233
- Idothea*
metallica, 52
- Inezia*
caudata, 215, 224, 225
subflava, 225
- Invertebrates of the South Georgia expedition, record of, 51
- Iridoprocne*, 158
albiventer, 159, 162
- Isotoma*
georgiana, 90, 91
- Jabiru*
mycteria, 369
- Jacamerops*
aureus, 324, 325
- Jacana*
jacana, 369
- Jacaniidæ*, 369
- Kellogg, Vernon L.
 Mallophaga from birds of the South Atlantic, 80
- Knipolegus*, 253, 254
orenocensis, 214, 218
pusillus, 214, 219
- Koehler, R.
Anasterias octoradiata, nouvelle As-térie de la Géorgie du Sud, 64
- Læmobothrium*
giganteum, 89
- Lampornis*
nigricollis, 298
- Lampropzar*
tanagrinus
guianensis, 202, 210
- Laniocera*
hypopyrrha, 247, 250
- Lanius*
agilis, 155
carbo, 178
cayanus, 251
leverianus, 183
lictor, 240
lineatus, 275
lunulatus, 275
nævius, 276
pitanga, 241
tyrannus, 245
- Larus*
atricilla, 374
dominicanus, 69, 90
- Laridæ*, 373
- Lasionycteris*
noctivagans, 2, 5
- Lasiurus*
borealis, 2, 8
cinereus, 2, 12
- Lathria*, 247
cinerea, 250, 254
- Legatus*
albicollis, 207
albicollis, 213, 232
- Leistes*
militaris, 202, 209
- Leptodon*
cayennensis, 346
uncinnatus, 345
- Leptogium*
tremelloides, 62
- Leptotila*
rufaxilla
dubusi, 353
rufaxilla, 352
verreauxi, 352
- Leucolepis*
musicus, 142
- Lipaugus*, 247
immundus, 251, 255
simplex
immundus, 255

- Lipeurus*, 80
 angulicollis, 81
 celer, 85
 clypeatus, 86
 densus, 85
 diversus, 85
 eatoni, 81, 86
 fuliginosus, 85
 gaini, 85
 gracilicornis
 minor, 86
 grandis, 85
 gurli, 86
 laculatus, 85
 macilhennyi, 81
 setosus, 81, 86, 87
 Long Island bats, artificial key to, 2
 Long Island fauna and flora—I. The
 bats (order Chiroptera), Robert Cush-
 man Murphy and John Treadwell
 Nichols, 1
 Long Island fauna and flora—II. A Long
 Island *Acmaea* and a new variety of
 Urosalpinx cinerea, by Silas C. Wheat,
 17
 Long Island fauna and flora—III. The
 frogs and toads (order Salienta), by
 Frank Overton, 21
Lophornis
 ornatus, 299
 verreauxi
 klagesi, 300
Loxira
 angolensis, 187
 crassirostris, 186
 grossus, 186
 lineola, 187
 minuta, 189
Machæropterus
 pyrocephalus, 247, 249
Machetornis
 rixosa
 flavicularis, 215, 219
Majagueus
 æquinoctialis, 86
Mallophaga from birds of the South
 Atlantic, by Vernon L. Kellogg, 80
Manacus
 manacus interior, 247, 249
Marasmus
 hæmatocephalus, 61
Marchantia
 cephaloscypha, 62
 polymorpha, 62
Margarita
 expansa, 70
 hillii, 70
Maso, 78
Megaceryle
 torquata
 torquata, 326
Megalestris
 antarctica, 84, 85
Megarhynchus
 pitangua, 214, 241
Melanerpes
 cruentatus, 306
 terricolor, 305
Menopon
 mesoleucum, 89
Mesopicus
 cassini, 306
Metacilla
 calidris, 155
Micrastur
 brachypterus, 344
Microcerculus
 caurensis, 143, 147
 semitorquatus, 344
Micrococyx
 pumilus, 310, 312
Micropidæ, 303
Microrhopias
 cano-fumosus, 274, 285
 orenocensis, 274, 285
Microcolex
 georgianus, 52
Microxenops
 milleri, 257, 264
Milvago
 chimachima, 341
Milvulus
 tyrannus, 240
Milvus
 leucurus, 345
Mimus
 gilvus
 melanopterus, 140
Mionectes
 oleogineus, 226
Mirounga
 leonina, 43, 51, 69
Mitua tomentosa, 355

- Mniotiltidae, 151
- Modiolarca
bicolor, 70
exilis, 70
subquadrata, 70
- Mollusca from South Georgia, by Wm. H. Dall, 69
- Molothrus
atronitens, 202
bonariensis
venezuelensis, 175, 202, 210
cabanisi, 202
venezuelensis, 208, 211
- Momotidae, 327
- Momotus
braziliensis
ignobilis, 328
ignobilis, 328
momota, 327
- Monasa
nigra, 320, 322
- Motacilla
æquinoctialis, 152
æstiva, 153
cayana, 165
galeata, 223
noveboracensis, 154
rubicilla, 153
spiza, 164
- Murphy, Robert Cushman and Nichols, John Treadwell, Long Island fauna and flora—I. The bats (order Chiroptera), 1-15.
- Murphy, Robert Cushman, The penguins of South Georgia, 103
- Muscicapa
anthoides, 293
barbata, 242
coronata, 242
flaveola, 226
icterophrys, 218
maculata, 240
oleaginea, 226
pica, 216
purpurata, 255
pygmaea, 283
sulphurea, 253
tyrannulus, 243
varia, 245
- Muscipeta
flaviventris, 237
- Muscivora
coronata, 242
tyrannus, 246
- Mycteria
americana, 369
- Myiarchus
coalei, 244
tyrannulus
tyrannulus, 243
ferox
venezuelensis, 244
tricolor, 244
tuberculifer
tuberculifer, 244
- Myiobius
barbatus
atricaudus, 242
barbatus, 214, 242
erythrurus, 242
modestus, 214, 242
- Myiochanes
brachytarsus, 243
- Myiodynastes
audax, 240
maculatus
maculatus, 213, 240
- Myiopagis
viridicata
viridicata, 215, 229
gaimardi, 215, 230
flavivertex, 230
cinerea, 230
- Myiothera
ruficeps, 292
- Myiozetetes, 143
cayanensis
cayanensis, 235
rufipennis, 214, 233, 261
granadensis, 235
inornatus, 238
texensis
columbianus, 175, 234, 261
sulphureus, 235
superciliosus
columbianus, 233, 234
- Mylops
sparsutus, 94
- Myospiza, 185
manimbe, 196
- Myotis
lucifugus, 2, 3, 5, 6

- Myotis
 subulatus, 2, 4
 Myrmeciza
 atrothorax, 288
 boucardi
 griseipectus, 274
 longipennis
 griseipectus, 288
 schistacea, 274, 288
 Myrmoborus
 leucophrys, 290
 leucophrys, 273
 melanopogon, 273, 291
 myotherina, 290
 myotherina, 273, 290
 Myrmoderas
 atrothorax, 274, 288
 Myrmoderus
 atrothorax, 288
 Myrmopagis
 axillaris, 274, 282
 hæmatonota
 hæmatonota, 273
 melæna, 274, 282
 schisticolor, 273, 274
 interior, 281
 sanctæ-mariæ, 281
 Myrmothera
 axillaris, 282
 guttata, 283
 Myrmotherula
 axillaris, 282
 cherriei, 273, 282, 283
 cinereiventris
 cinereiventris, 273, 284
 pallida, 273, 284
 guttata, 273, 283
 hæmatonota, 284
 longipennis, 273, 284
 melanura, 274, 282
 pygmaea, 273, 283
 pyrrhonota, 284
 surinamensis, 283
 surinamensis, 273, 283
 Nacella
 polaris, 69
 Nannochordeiles
 pusillus
 septentrionalis, 302
 Nasica
 guttatoides, 266
 Nasica
 longirostris, 265, 269
 Nematodes, 51
 Nemosia
 flavicollis, 182
 flavicollis, 182
 nigrogenys, 198
 pileata, 168
 Neobuccinum
 densicathratum, 69
 Neomorphus
 nigrogularis, 310, 315
 rufipennis, 310, 315
 Neopelma
 igniceps, 247
 Neophron
 percnopterus, 89
 Nettion
 brasiliense, 373
 Nichols, John Treadwell, and Murphy,
 Robert Cushman, Long Island fauna
 and flora—I. The bats (order Chirap-
 tera), 1-15.
 Nirmus
 setosus, 80
 triangulatus
 alpha, 84
 Nonnula
 duidæ, 320, 321
 Notharchus
 hyperrhynchus
 dyssoni, 319, 320
 tectus
 tectus, 319, 320
 Notimaso, 78
 australis, 79
 Notiopsylla
 kerguelensis, 90
 Numenius, 82
 hudsonicus, 371
 variegatus, 83
 Nystactes
 tamatia
 tamatia, 320
 Nyctanassa
 violacea, 364
 Nycticorax
 gardeni, 364
 nycticorax nævius, 364
 Nyctidromus
 albicollis
 albicollis, 301

- Nyctipolus*
 nigrescens, 302
Nyctiprogne
 leucopygia, 303

Oceanites
 oceanicus, 7
Oceanodroma
 leucorhoa, 84
Ochthoeca
 arenacea, 242
 flaviventris, 243
Ochthornis
 littoralis, 218
Odontaster
 validus, 64
Odontophorus
 guyanensis, 357
Œdicnemidæ, 368
Œdicnemus
 bistriatus, 368
Œnops
 pernigra, 336
Œstrelata
 incerta, 85, 86, 88
 mollis, 86, 88
Olfersia
 spinifera, 93
Onychorhynchus
 coronatus, 213, 242
Opisthocomidæ, 357
Opisthocomus
 cristatus, 357
 hoazin, 343, 357
Oparornis
 agilis, 151, 153
Orca, 40
Orinoco region, a contribution to the
 Ornithology of the, by G. K. Cherrie,
 133a-374
Oriolus
 chrysocephalus, 205
 hæmorrhous, 205
 icterocephalus, 209
 icterus, 207
 mexicanus, 208
 oryzivorus, 210
 picus, 268
 xanthornus, 206
Ornismya
 orthura, 299

Ornithomyia
 unicolor, 93
Ornithion
 inermis, 227
 pusillum
 napæum, 215, 227
Ortalida
 ruficauda, 356
Ortalis
 motmot, 356
 ruficauda, 355
Orthotrichum
 crassifolium, 62
Oryzoborus, 185
 angolensis, 187
 crassirostris, 186
Ossifraga
 gigantea, 85, 88
Ostinops
 decumanus, 202, 203
 viridis, 202, 203
Otus
 cholibus, 349
Overton, Frank
 Long Island fauna and flora -III.
 The frogs and toads (order Sa-
 lientia), 21

Pachyptila
 cærulea, 86
Pachyrhamphus
 albinucha, 253
 atricapillus, 250, 253
 cinereus, 251, 252
 marcidus, 251, 252
 marginatus, 251, 253
 niger, 250
 polychropterus
 niger, 250, 251, 252
Pachysylvia
 aurantiifrons
 saturata, 154, 156
 brunniceps, 154, 157
 ferrugineifrons, 154, 156
 flavipes
 acuticauda, 154, 156
 musciapina
 musciapina, 155, 156
 thoracica
 griseiventris, 154, 155
 semicinerea, 155, 156

- Palamedia*
 cornuta, 366
Palamedeidae, 366
Pandarus
 satyrus, 71, 72
 cranchii, 71, 72
Pandarus satyrus Dana, the male of, by
 Charles B. Wilson, 71
Pandion
 haliaetus
 carolinensis, 348
Parabuteo
 unicinctus, 342
Paramera
 austrina, 73, 74
Paroaria
 nigrogenys, 185, 198
Parra
 cayennensis, 370
 jacana, 369
Parula
 putiayumi, 151
Parus
 aureolus, 248
 erythrocephalus, 248
 pipra, 248
Patella
 fuegiensis, 69
 polaris, 69
 testudinalis, 18
Pauxi
 pauxi, 355
Pedicellaster
 octoradiatus, 67
Pelecanoides
 urinatrix, 80, 86, 87, 91
Pelobatidae, 25
Penelope
 jacupeba, 356
Penguins, the, of South Georgia, by
 Robert Cushman Murphy, 103
Perdix
 sonnini, 357
Perimylops
 antarcticus, 94
Periporphyrus
 erythromelas, 186
Perissotriccus
 ecaudatus, 223
Peristera
 pretiosa, 354
Phæomyias
 murina
 incomta, 216, 226
Phæoprogne
 tapera
 immaculata, 159, 160
Phæthornis
 caurensis, 294
 superciliosus, 293
Phæthus
 chloropoda, 373, 374
 magnirostris, 374
Phæton, 47
 lepturus, 86
Phalacrocoracidae, 366
Phalacrocorax atriceps georgianus, ana-
 tomical notes of the young of, by R.
 W. Shufeldt, 95
Phalacrocorax
 atriceps
 georgianus, 95
 vigua, 367
Phasianus
 hoazin, 357
 motmot, 356
Philherodius
 pileatus, 364
Philydor, 257
 ceroicalis, 263
 consobrinus, 264
 pyrrhodes, 257, 263
 ruficaudatus, 257, 263
 rufipileatus
 consobrinus, 257, 264
Phimosus
 berlepschi, 361
 nudifrons, 361
Phœnocthraupis
 rubrica
 rubrica, 168, 179
Phœtornis
 affinis
 affinis, 293
 angusti, 294
 caurensis, 294
 hispidus, 294
 ruber
 episcopus, 294
 rupurumii
 rupurumii, 294
Photinula
 expansa, 70

- Phygopedius*
griseipennis
caurensis, 143, 149
- Physter*
macrocephalus, 51
- Piaya*
cayana
cayana, 310, 312
columbiana, 310, 313
antianensis, 312, 313
insulana, 310, 314
melanogastra, 309, 310, 312
rutila, 314
orinocensis, 310, 314
- Picidæ*, 304
- Picidæ*, key to the genera and subspecies
 of, 304
- Picolaptes*
albolineatus, 265, 269
notatus, 267
- Picumnus*
leucogaster, 305, 309
stellæ, 305, 309
undulatus, 305, 309
- Picus*
certhia, 271
cruentus, 306
flavigula, 305
flavus, 308
grammicus, 307
jumana, 307
lineatus, 309
melanoleucos, 308
passerinus, 307
rubrifrons, 306
rubricollis, 308
- Pionites*
melanocephala, 329, 335
- Pionus*
fuscus, 329, 334
menstruus, 329, 334
- Pipile*
cumanensis, 357
- Pipra*
albifrons, 291
aureola
aureola, 247, 248
cinerea, 252
erythrocephala
erythrocephala, 247, 248
flavogaster, 228
filiacauda, 247
- Pipra*
leucocephala, 217
leucocilla, 248
nævia, 290
pipra
pipra, 247, 248
pyrocephala, 249
rupicola, 256
stolzmanni, 248
virescens, 248
- Pipromorpha*
oleaginea
oleaginea, 215, 226
pallidiventris, 215
- Piranga*
rubra
rubra, 168, 179
- Piscicola*
p., 52
- Pisobia*
fuscicollis, 372
- Pisorhina*
choliba, 349
- Pitangus*
derbianus
rufipennis, 233, 239
lictor, 214
sulphuratus
rufipennis, 144, 145, 175, 207
trinitatis, 214
- Pithys*
albifrons, 275, 291
leucophrys, 290
- Pitylus*
grossus, 186
- Plagodium*
elegans, 62
- Planesticus*, 134, 135
albiventer, 135, 137, 139, 141
fumigatus, 135, 139
gymnophthalmus, 135, 137, 139, 141
phæopygus
phæopygoides, 135, 140
phæopygus, 135, 140
- Plants collected on the South Georgia
 expedition, by Norman Taylor, 60
- Platalea*
ajaja, 360
- Plataleidæ*, 360
- Platypsaris*
minor, 250, 251
- Platytricus griseiceps*, 219

- Platytriccus*
 mystaceus
 insularis, 220
 saturatus, 214, 220
Platyrrhynchus
 griseiceps, 219
 mystaceus
 insularis, 220
 saturatus, 220
 sulphureus, 236
 rubicauda, 238
Plotus
 anhinga, 300
Poa
 fiabellata, 61, 63, 114
Podager
 nacunda, 303
Polemistria
 verreauxi
 klagesi, 300
Polioptila
 livida
 innotata, 150
 livida, 150
 nigriceps, 150
 plumbiceps, 150
Polioptila, key to subspecies of, 150
Polyborus
 auduboni, 340
 cherimay, 340
 chimachima, 341
Polystichum
 mohroides, 60
Porania
 antarctica, 52
Porzana
 albicollis, 367
Priocella
 glacialoides, 85
Priofinus
 cinereus, 85
Prion
 banksi, 90
Procellaria
 pelagica, 85
 glacialis, 89
Prodelphinus
 froenatus, 46
Progne, 158
 chalybea
 chalybea, 159, 160
 subis
 subis, 159
 tapera, 160
Protonotaria
 citrea, 151
Psaris
 erythrogegens, 251
Pseudofiersia
 spinifera, 93
Psilopornis
 albirostris, 324, 325
Psittacara
 hahni, 330
Psittacidae, 328
Psittacidae, key to the genera, species
 and subspecies of, 329
Psittacula
 guianensis
 viridissima, 329, 332
 modesta
 modesta, 329, 332
 slateri, 332
Psittacus
 amazonicus, 334
 ararauna, 330
 caicus, 335
 chrysopterus, 332
 fuscus, 334
 leucophthalmus, 331
 macao, 329
 melanocephalus, 335
 menstruus, 334
 ochrocephalus, 333
 pictus, 331
 severa, 330
 vulturinus, 335
Psolidium
 convergens, 64
Psophia
 crepitans, 368
Psophiidae, 368
Pteremis
 nivalis, 92
Pteroglossus
 atricollis, 319
 aracari
 roraimae, 317, 319
 flaviventris, 317
 flavirostris
 flavirostris, 318
 pluricinctus, 317, 318

- Pteroglossus*
viridis, 317, 319
- Puffinus*
anglorum, 85
- Pulex*
kerghuelensis, 90
- Pygiptila*
maculipennis, 279
stellaris, 272, 279
- Pygochelidon*
cyanolenta, 159
- Pygoscelis*, 116
adeliae, 115, 123, 124, 127, 133
antarctica, 103, 129, 130, 131, 133
papua, 52, 104, 113, 115, 117, 118,
122, 123, 124, 127, 128, 129, 130,
131, 132, 133
- Pyriglena*
tyrannina, 287
- Pyrocephalus*
rubinus
saturatus, 214, 217
- Pyroderus*
orenocensis, 250
scutatus
orenocensis, 255, 256
- Pyrrhocorax*
columbianus, 313
- Pyrrhula*
bouvronides, 189
- Pyrrhura*
melanura, 329, 331
picta
picta, 320, 331, 332
- Querula*
minor, 251
purpurata, 250, 255
- Quiscalus*
lugubris, 211
- Rallidæ*, 367
- Rallus*
albicollis, 367
- Ramphastidæ*, 316
- Ramphastidæ*, key to the genera, species
and subspecies of, 317
- Ramphastos*
culminatus, 317, 318
cuvieri
inca, 317
hæmatorhynchus, 317
- Ramphastos*
momota, 327
monilis, 317
osculans, 317
viridis, 318
vitellinus, 317, 318
- Ramphocænus*
melanurus, 292
trinitatis, 273, 292
trinitatis, 292
- Ramphocelus*
atrosericeus
capitalis, 168, 178, 179
carbo, 168, 178
jacapa, 178
magnirostris, 168, 178, 179
- Ramphotrigon*
ruicauda, 238
- Rana*
catesbiana, 25, 26, 38, 40
clamitans, 25, 26, 38, 40
palustris, 25, 26, 35
pipiens, 25, 26, 34, 40
sylvatica, 25, 26, 36, 40
- Ranidæ*, 25
- Ranunculus*
biteratus, 61
- Rhagida*
kerghuelensis, 78
- Rhinoptynx*
clamator, 349
- Rhopothera*
punctulata, 290
- Rhopoterpe*
torquata
torquata, 271, 291
- Rostrhamus*
sociabilis, 346
- Rhynchocyclus*
flaviventris
flaviventris, 215, 237
klagesi, 236
olivaceus
guianensis, 235
poliocephalus
sclateri, 236
sulphurescens
sulphurescens, 215, 236
assimilis, 215, 236
- Rhynchops*
nigra
cinerascens, 374

- Rupicola*
rupicola, 236
- Rupornis*
magnirostris, 342
- Saurophagus*
rupestris, 239
- Saltator*, 184, 185
magnus, 200
maximus, 200
olivaceus, 200
oreocensis, 200
rubicus, 179
- Saucerottia*
cupreocauda, 296
erythronota
caurensis, 296
- Scotothorus*
turdinus
amazonum, 247
olivaceus, 247
- Scaphiops*
holbrookii, 25, 26, 28, 40
- Schistochlamys*
aterrima, 168
atra, 183
- Schaeffer, Charles
 Collembola, Siphonoptera, Diptera
 and Coleoptera of the South
 Georgia Expedition, 90
- Scardafella*
squamata
ridgewayi, 354
- Scopolax*
caudatus, 361
- Scolothorus*
~~*amazonum*~~
turdinus
amazonum, 247, 249
olivaceus, 247, 249
wallacei, 249
- Scelateria*
argentata, 272, 273, 287
schistacea
caurensis, 272, 273, 287, 288
- Scapanus*
melanoleucus, 304, 308
rubricollis, 305, 308
trachelopyrus, 305
- Scolothorus*
amazonum
wallacei, 249
- Scolothorus wallacei*, 249
turdinus
amazonum, 247, 249
olivaceus, 247, 249
- Scolopax*
brasiliensis, 372
flavipes, 371
melaneticus, 371
paraguake, 372
- Setophaga*
ruticilla, 151, 153
- Seiurus*
noveboracensis, 151, 154
- Serolis*
septemcarinata, 53
- Serinopsis*
arvensis
minor, 195
- Serpophaga*
caudata, 224
hypoleuca, 225
orinocensis, 224
subflava, 225
- Shoemaker, Clarence R.
 Amphipods of the South Georgia
 Expedition, 73
- Shufeldt, R. W. Anatomical notes on
 the young of *Phalacrocorax atriceps*
georgianus, 95
- Sicalis*
arvensis
minor, 195
columbiana, 185, 193
flaveola, 185, 191, 207
- Sisopygis*
icterophrys, 214, 218
- Sitta*
surinamensis, 283
- Siptornis*
hyposticta, 257, 261
vulpina
alopencias, 260
- Sittasomus*
amazonus, 264, 265
sylvellus
amazonus, 265
- South Georgia, the penguins of, by Robert
 Cushman Murphy, 103
- South Georgia Expedition, a report on
 the, by Robert Cushman Murphy, 41.
- South Georgia, 53

- Sparvius**
 bicolor, 341
 caerulescens, 345
Speotyto
 cunicularia
 brachyptera, 349
Spermophila
 bouvronides, 189
 ocellata, 189
 whitleyana, 189
 trinitatis, 189
Spheniscus, 131
Spinus
 mexicanus
 columbianus, 191
Spiza, 185
 americana, 108
Spizæus
 ornatus, 345
Sporathraupis
 cyanocephala
 subcinerea, 168
Sporophila, 186
 bouvronides, 186, 189, 190
 grisea
 grisea, 186
 gutturalis, 186, 190
 lineola, 186, 189
 trinitatis, 189
 minuta
 minuta, 186, 189
 plumbea
 whitleyana, 186, 189
Stebbingia
 gregaria, 73, 75
Stelgidopteryx
 ruficollis
 æqualis, 159, 160
 urpygialis, 160
Stenopsis
 cayennensis, 300
 insularis, 300
 monticola, 300
Stenurus
 minor, 51
Stereorarius
 crepidatus, 81
Sterna
 chloropoda, 373
 superciliaris, 374
 lunata, 81
 paradisea, 81, 85, 86
 Strigidæ, 349
 Strix
 choliba, 349
 flamma
 pratricula, 349
 perlata, 349
 Sturnella
 magna
 meridionalis, 202, 209
 Sublegatus
 glaber, 231, 232
 brevirostris
 glaber, 231
 Sylvia
 agilis, 153
 bicolor, 165
 chivi, 155
 pitiayumi, 151
 Sylviidæ, 149
 Synallaxis
 albescens
 albigularis, 257, 261
 alopecias, 257, 260
 cinnamomea, 211, 257, 259
 guyanensis
 guyanensis, 257, 260
 hyposticta, 261
 rutilans, 257, 260
 vulpina
 alopecias, 257, 260
 Syrigma
 sibilatrix, 365
 Tachycineta
 albiventer, 162
 Tachytriorchis
 albicaudatus
 exiguus, 343
 Tæniotriccus
 andrei, 223
 erythrurus
 erythrurus, 216
 Tachyphonus
 cristatus
 cristatellus, 168, 181
 intercedens, 168, 182
 huetus, 160, 181
 rubica
 rubica, 169
 rufus, 169, 180

- Tachyphonus
 surinamus
 surinamu-, 169, 182
 Talpacotia
 rubripennis, 353
 Tamatia
 bicinctus, 321
 Tanagra
 atra, 183
 cana, 174, 177
 cayana, 172
 cayana, 168, 172
 chlorotica, 169
 aurea, 167
 violaceicollis, 170
 chrysopasta, 171
 desmaresti, 168
 gyrola, 168
 iridina, 172
 maxima, 200
 melanura, 167, 171
 mexicana
 media, 167, 173
 vieillotii, 168, 173, 174
 militaris, 209
 olivacea
 olivacea, 167, 171
 palmarum
 melanoptera, 177
 paradisea, 168, 172
 rufa, 180
 rufiventris, 167, 171
 silcus, 167
 trinitatis, 167, 169, 170, 171
 violacea
 lichtensteini, 167
 xanthogastra, 168, 172
 Tanagrella
 iridina, 168, 172
 Tantalus
 cayennensis, 361
 loculatus, 360
 ruber, 362
 Tapera
 nævia, 310, 314
 Tarabra
 major
 albicrissa, 271, 272
 Tauria
 macrocephala, 73, 76
 Taylor, Norman. Plants collected on
 the South Georgia Expedition, 60
 Tectura
 testudinalis, 18
 Temperature and precipitation at Royal
 Bay, 58
 Terenotriccus
 erythrurus
 erythrurus, 216, 242
 Terenura
 spodiophila, 274, 286
 Tetrao
 cinereus, 360
 pilatus, 360
 variegatus, 360
 Tetraonidæ, 357
 Thalassogeron
 chlorohynchus, 85, 86, 88
 Thalurania
 furcata
 fissilis, 298
 refulgens, 298
 tschudii, 297
 Thamnomanes
 glaucus, 273, 281
 cæsius
 cæsius, 281
 glaucus, 281
 hoffmannsi, 281
 persimilis, 281
 schistogynus, 281
 Thamnophilus
 albicrissus, 275
 amazonicus, 272
 canadensis, 277
 trinitatis, 276, 277
 cinereiceps, 276
 cinereoniger, 276
 doliatus, 271, 272
 doliatus, 278
 fraterculus, 278
 lunulatus, 275
 major
 albicrissus, 275
 myiotherinus, 290
 nævus, 276
 polionotus, 275
 saturninus, 280
 stellaris, 279
 trinitatis, 276
 Thaumantias
 chionopectus, 296
 Theristicus
 caudatus, 361

- Thermochalcis*
 cayennensis
 insularis, 300
- Thlypopsis*
 sordida
 sordida, 168, 183
- Thraupis*
 cana, 246
 cana, 168, 177
 episcopus
 nesophilus, 168, 174
 glaucozona, 168
 palmarum
 melanoptera, 168, 177
 palmarum, 168
- Thripophaga*
 cherriei, 257, 262
- Thryophilus*, 142
 albipectus, 147
 albipectus, 142, 147, 148
 bogotensis, 143, 148
 hypoleucus, 143, 148
- Thryothorus*
 griseipennis
 caurensis, 149
- Tiaris*
 fuliginosa, 186
- Tigrisoma*
 brasiliense, 366
 lineatum, 366
- Tinamidæ*, 360
- Tinamus*
 soui, 360
- Tinnunculus*
 sparverius
 isabellinus, 347
- Tityra*
 cayana, 251
 erythrogastrus, 251
 inquisitor
 erythrogastrus, 251
- Todirostrum*
 cinereum
 cinereum, 214, 220
 caudatum, 223
 maculatum, 221
 schistaceiceps, 221
- Todus*
 cinereus, 220
 maculatus, 221
 marginatus, 253
- Totanus*
 flavipes, 371
 melanoleucus, 371
- Trematodes*, 51
- Tringa*
 fuscicollis, 372
 macularia, 371
 solitaria, 371
- Tringoides*
 macularia, 371
- Tripsurus*
 cruentatus, 304, 306
 rubrifrons, 304, 306
- Trochilidæ*, 293
- Trochilus*
 amethystinus, 299
 augusti, 294
 auritus, 299
 cæruleus, 297
 fimbriatus, 295
 gramineus, 298
 hirsutus, 293
 largipennis, 294
 longicaudus, 300
 longirostris, 299
 mellivorus, 295
 mosquitus, 298
 nigricollis, 298
 ornatus, 299
- Troglodytes*
 musculus
 clarus, 143, 149
- Troglodytidæ*, 142
 Key to the genera, species and sub-species of, 142
- Trogon*
 strigillatus
 strigillatus, 328
 violaceus
 violaceus, 328
 viridis, 328
- Trogonidæ*, 328
- Tryphosa*
 kergueleni, 73, 74
- Turdidæ*, 134
 Key to the genera, species and sub-species of, 135
- Turdus*
 albiventer, 137
 fumigatus, 139
 gymnophthalmus, 135
 phæopygoides, 140

- Turdus
 phaeopygus, 140
 surinamus, 182
 Tyrannus
 albicollis, 232
 dominicensis, 245
 melancholicus, 176, 245
 rixosus, 219
 satrapa, 245
 Tyrannneutes
 stolzmanni, 247, 248
 virescens, 247
 Tyrannidae, 213
 Tyrannidæ, key to the genera, species
 and subspecies of, 213
 Tyranniscus
 gracilipes, 228
 Tyrannopsis
 sulphureus, 215, 235
 Tyrannulus
 elatus
 elatus, 215, 228
 Tyto
 perlata, 349
 Urubitinga
 anthracina, 343
 urubitinga, 343
 zonura, 343
 Urogalba
 dea, 324
 Uranomitra
 whitelyi, 296
 Urosalpinx
 cinerea, 20
 aitkenæ, 20
 Usnea
 sulphurea, 62
 Vanellus
 cayennensis, 370
 Venilicornis
 cassini, 304, 306
 orenocensis, 304, 306
 passerinus, 304, 307
 Vespertilio
 fuscus, 2, 7
 Vireo
 chivi, 155
 Vireolanius
 leucotis
 chlorogaster, 155, 157
 Vireonidæ, 154
 Vireonidæ, key to the species and sub-
 species of, 154
 Vireosylvia
 calidris
 calidris, 154, 155
 chivi
 agilis, 154, 155
 olivacea, 154, 155, 156
 Volatinia, 185
 jacarina
 splendens, 185, 190
 Vultur
 papua, 339
 Waldeckia
 zsehani, 73
 obesa, 73
 Weather condition at Bay of Isles, 59
 Wheat, Silas C.
 Long Island fauna and flora—II. A
 Long Island Acmaea and a new
 variety of Urosalpinx cinerea, 17
 Wilson, Charles B.
 The male of Pandarus satyrus
 Dana, 71
 Xanthornus
 auricapillus, 205
 chrysocephalus, 205
 decumanus, 203
 icterus, 207
 xanthornus, 207
 Xanthosomus
 icterocephalus, 203, 209
 Xanthura
 yncas
 cæruleocephala, 212
 Xenops, 257
 genibarbis, 257, 264
 Xenopsaris, 253
 albinucha, 250, 253
 Xiphocolaptes
 major, 265
 orenocensis, 269
 Xiphorhynchus
 guttatus
 guttatoides, 265, 266
 sororia, 266
 jardinei, 265
 lineatocapillus, 267

Niphorhynchus
 obsoletus
 notatus, 265, 267
 pardalotus, 265, 267
 susurrans, 265
 susurrans, 266, 267
Zebrilus
 pumilus, 366

Zenaida
 vinaceorufa, 351
 ruficauda
 vinaceorufa 351
 robinsoni, 351
Zygophyllum
 simplex, 63

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LONG ISLAND FAUNA AND FLORA.—I.

THE BATS (Order CHIROPTERA).

BY ROBERT CUSHMAN MURPHY AND JOHN TREADWELL NICHOLS.

Bats have their closest affinities with the Insectivores; but they are more sharply marked off from their nearest relatives than any other mammalian order.

Among the specialized structures correlated with their habit of aerial locomotion are the extensible membrane stretching from the sides of the body, connecting the greatly elongated digits of the hand, and extending from thence to the hind limb and usually to the tail; and the rotation of the axis of the femur so that the knee projects outward instead of forward. These characters, which make possible exceedingly dexterous and graceful flight, render bats awkward and all but helpless on a flat surface.

The mammae are pectoral, and there is commonly but a single pair. Tactile organs of astonishing delicacy are present in the skin of the wing membranes, and there are not infrequently other structures of sensory importance, such as leaf-like appendages on the snout, and the elongated tragus of the ear. Extended experiments have shown, however, that neither the ear pinna nor the tragus are necessary for the perception of obstacles while the bat is in flight. Perception is probably due to the condensation of the atmosphere between the bat and the object it is approaching, and the sense organs involved are located inside the ear.

There is much evidence to show that a sense of direction exists in bats.*

Among most bats the type of reproduction is unique. Copulation occurs in autumn before hibernation begins. At this period some agency, probably an exudation from the preputial glands of the

*W. L. Hahn, Some habits and sensory adaptations of cave inhabiting bats, 1908.

male, causes a modification of the mucous membrane lining the neck of the uterus, so that the canal becomes plugged with coagulated secretion. Fertilization does not then ensue as in other mammals; on the contrary, the mass of spermatozoa is held in the uterine chamber throughout the lethargy of winter, and not until active life is resumed after several months, do the ova descend.* Among Long Island species impregnation probably takes place during April.

Despite the fact that bats have been observed by men in all ages, conspicuously little is known of the life histories of even our most abundant and familiar species. This is due to their crepuscular or nocturnal habits, and to their secretiveness during the long hours and seasons in which they are not seen in flight. Sleepiest of mammals, not excepting even the drowsy Dormouse of the Old World, the winged fur bearers, who alone in the highest class of creatures have realized the envied accomplishment of birds, spend the greater part of their lifetime hanging head downward in slumber, and slumber often so profound that a brief nap may become the equivalent of hibernation, accompanied by a fall of temperature and retarding of most bodily functions.

The five species of bats known to inhabit Long Island belong to the family Vespertilionidae, the largest and most widely distributed division of the order. Several of the species, or possibly all of them, make seasonal migrations of unknown extent. They are without exception strictly insectivorous.

ARTIFICIAL KEY TO LONG ISLAND BATS.

(For purposes of comparison, a Yellow Swallowtail Butterfly has a wing expanse up to 5 inches, a Cardinal of about 9 inches, a Chimney Swift 12", and a Kingbird 14".)

- a. Large. Expanse of wing 12 to 15 inches.
 - b. Interfemoral membrane densely furred above. Color mottled brown, tawny and white, white predominating below. 5. *Lasiurus cinereus*.
 - b'. Interfemoral membrane naked above. Color uniform, above dark brown, below buffy gray. 1. *Vesperugo americanus*.
- a'. Not large. Expanse of wing not over 12 inches.
 - c. Medium. Expanse of wing 9 to 12 inches. Fur more or less tipped with whitish.
 - d. Interfemoral membrane densely furred above. Color tawny or grayish. 4. *Lasiurus borealis*.
 - d'. Interfemoral membrane furred basally only above. Color blackish. 2. *Lasionycteris noctivagans*.
 - c'. Small. Expanse of wing 9 inches or less.
 - e. Five teeth in the side of the jaw behind canine, a single minute one immediately behind canine. Color above often mottled, below yellow brown (Extra limital) *Pipistrellus subflavus*.
 - e'. Six teeth in the side of the jaw behind canine, two minute ones immediately behind canine. Color above almost always uniform, below dark buffy gray.
 - f. Ear and tragus slender, the latter 9 mm. or more in length (Extra limital) *Myotis subulatus*.
 - f'. Ear and tragus short and broad, the latter 8 mm. or less in length. 3. *Myotis lucifugus*.

*Rollinot and Trouessart, Mem. Zool. Soc. France, IX, 1896, p. 214; also see Rollinot and Trouessart, Mem. Zool. Soc. France, X, 1897, p. 114.

1. LITTLE BROWN BAT

Myotis lucifugus (Le Conte)

Length 8.75 centimeters (3.40 inches). Teeth, incisors $\frac{2-2}{3-3}$, canines $\frac{1-1}{1-1}$, premolars $\frac{2-2}{3-3}$, molars $\frac{2-2}{3-3}$ = 38. Above dark grayish brown, below dark buffy gray. A few sparse hairs on the flight membranes near the body; flight membranes otherwise naked. Ear moderate.

Though abundant in New England and found in most parts of the North American continent, the Little Brown Bat has been almost overlooked on Long Island. Elsewhere it is said to be a typical cave-dwelling bat in winter, and the fact that there are no caves worthy of the name on Long Island accounts perhaps for the scarcity of this smallest species.

The first Little Brown Bats actually collected on Long Island were three shot from a flock of a dozen or more at Cold Spring Harbor in July, 1900, by Mr. George K. Cherrie. Since that date the senior writer has seen the species during August and September at various localities near the western end of the Island and along the south shore. It is a pastoral species; that is, it does not inhabit towns and in this locality certainly it rarely frequents houses even in the isolated districts. Hence it is, at best, an animal not likely to come to one's attention unless hunted for, and continued search may prove it less rare than has been supposed. Presumably the traits of the species on Long Island do not differ materially from its customs on the mainland of southern New England where it occasionally appropriates a napping place behind the shutters or in the garret of some lonesome farm house, but for the most part prefers the dark hollow of an ancient and decrepit forest tree, or a snug berth behind a sheet of warping bark, where whole clusters of Little Brown Bats, like swarming bees, sometimes may be found clinging together.

Although it has been stated not to be an urban resident, the senior author recalls that several individuals of the species once spent the winter, at least, in the library of a venerable New England college situated in the quiet and well wooded section of a large city. And one sunny April morning, at the same college, he captured a live one which had caused much amusement by flitting about the chapel during the matin services, finally alighting on a portrait frame where it fell instantly to sleep.

The Little Brown Bat is an early flier, beginning often before sunset to pursue the gnats, tiny beetles and other winged insects upon

which it feeds. Frequently it will fly to the surface of a pond or stream, dipping down to drink before beginning the evening meal.* Little is known of its activities through the late hours of the night, since it avoids village thoroughfares and the neighborhood of road lights, which might otherwise reveal its presence in the blackness. Probably, however, it becomes quiet after dark, for at dawn it may be seen again, circling the fields or forest openings, generally in the shadow of overhanging woods, darting in and out, and now and then mounting higher than the tree tops. Once two were observed at Floral Park, Long Island, apparently chasing each other back and forth among the trees until many minutes after an August sunrise had dispelled all dimness from the landscape. When overtaken by daylight the Little Brown Bats, according to Stone and Cram,† do not seek a particular roost, but hang themselves up to sleep in the nearest suitable hiding place, or sometimes from a limb in the open woods.

In the air this species may be distinguished readily from all its kindred save one, Say's Bat, *Myotis subulatus* (Say), which is not known to occur on Long Island. The small size of the Little Brown Bat, together with the much rounded appearance of the bend of the wing are its best marks of identification. It has been estimated that its rate of flight may equal twelve miles per hour, and it is very agile, wheeling or halting like a flash and sometimes turning a half somersault in the air in order that it may alight head downward. While clinging to a resting place it sometimes employs its thumbs as well as its robustly clawed feet, but according to Walter L. Hahn, "the feet alone are strong enough to support the animal for weeks at a time, and even to support several others of its kind when they cling to it." **Bunches of fifty or more have been found together.**

The mating of this species probably takes place after the end of summer. After this season both sexes pass into the more or less intermittent torpor of hibernation, from which they do not fully awake until April, although mild weather produces partial activities and perhaps continuance of the mating. At such times they have been known also to crawl or fly to the entrance of their winter retreats. The young are two in number and are born in mid-

*Mr. F. H. Ames of Brooklyn and Mr. E. L. Morris of the Brooklyn Museum report seeing a Little Brown Bat flying at 12:25 P. M., May 30, 1913, at Orontium Pond, north of Queens, L. I. The sun was shining brightly at the time. The bat circled above the pond and made three descents to the surface in order to drink.

†Stone and Cram, *American Animals*, 1902.

summer. They remain with their mother until old enough to shoulder their own responsibilities. For several weeks after birth their color is tawny yellow, quite different from the shining olive brown of the adult. The babies never know a nest or home of any sort. During the day they cling and nurse, closely wrapped in the elastic folds of the maternal wing membranes, but "when the old bat flits off into the twilight the youngsters often go with her, clinging about her neck, swinging away over the tree-tops and along the foggy water-side, while she chases the numberless little flying things of the dark.

"At times, however, she deposits them on the branch of a tree, where they hang sheltered by the leaves, while she goes off foraging by herself."*

2. SILVER-HAIRED BAT

Lasionycteris noctivagans (Le Conte)

Length 10 centimeters (4 inches). Teeth: incisors $\frac{2-2}{2-2}$, canines $\frac{1-1}{1-1}$, premolars $\frac{2-2}{2-2}$, molars $\frac{2-2}{2-2}$, =36. Color black. The fur narrowly tipped with silvery white. The basal portion only of the upper surface of the interfemoral membrane with fur. Ear short and broad.

The Silver-haired Bat, though rare on Long Island during most of the summer, is "tolerably common"† in Westchester County and the upper Hudson Valley, while in the Adirondacks, according to Dr. C. Hart Merriam, it is the "commonest bat, far outnumbering all the other species together." Of its status here Mr. Arthur H. Helme, in his "Notes on the Mammals of Long Island," writes: "Some years it is very plentiful, especially in late summer and early autumn, outnumbering even the Red Bat." We have, then, good evidence of a southerly migration of this species as the winter season approaches.

And yet by no means do all the Silver-haired Bats depart before the snows. Perhaps an extraordinarily deep cavity in a tree trunk, or a quiet dark house-loft offers tempting inducements for winter camps. At any rate Silver-hairs, compacted into furry little oblongs and utterly oblivious to the world around them, are not infrequently found in hollow trees cut in winter for firewood, and they also have been discovered hibernating in sky-scrapers, churches, wharf-houses, and the hulls of ships in New York City and Brooklyn, during the

*Stone & Cram, American Animals, 1902.

†John Rowley, The Mammals of Westchester County, New York, 1902.

months between December and March. From such data we may attribute to the Silver-haired Bat and other bats, a type of migration analogous to that of many birds, in which the individuals of a species within a given breeding range move southward in fall, only to be replaced by winter residents of the same species coming from a more northerly faunal area. On such an hypothesis, a counter tendency in spring would cause a northward flight of the species as a whole, until each group had reached its native habitat.

So long ago as 1887 Dr. Merriam proved that certain tree dwelling bats migrate. Records of the presence in winter of the Hoary, Red and Silver-haired Bats far southward of the territory where their young are born, as well as the occurrence of these species in spring and autumn on barren islands off the New England coast and on Cape Cod, showed a regular migration. Dr. Merriam's explanation is that the tree bats retreat southward in order to escape severe climatic conditions, while cave species, hibernating in the even coolness of their subterranean refuges, removed from the influence of both sudden and extreme changes of temperature, tarry in northern latitudes all the year. But there is evidence that even cave bats migrate. Walter L. Hahn, describing his observations on the Little Brown Bat (*Myotis lucifugus*) in caves near Mitchell, Indiana, writes: "Just after most of the bats of this species left the Shawnee Cave about the end of April, 1907, there was a period during which very few were seen flying about in the evening. A few weeks later they were seen again in abundance. It seems probable that the animals which wintered at this place migrated farther north and that the summer residents had passed the winter elsewhere."

The extent of the seasonal flights of bats, and the degree to which the various species partake of the migratory habit are still uncertain. Presumably the journeys are made chiefly at night after the manner of many birds. Arthur H. Howell, however, has recorded a diurnal flight observed at Washington, D. C., between the hours of nine and ten in the morning of September 28, 1907. This observer watched many bats flying steadily towards the southwest at altitudes estimated to vary between 150 and 400 feet. In this flight there were apparently individuals of the Silver-haired or Red species, as well as a few smaller animals, probably the Little Brown Bat or the Georgia Pipistrelle, or both.

Silver-haired Bats, in common with some other species, are fond

of waterways. During September they may be seen on the beaches of the Long Island Sound, jerking along in the wind against the red evening sky, now and again dashing out a short distance over the water; and they have been observed over Mt. Sinai Harbor and other salt water inlets, circling hundreds of feet above the surface. Dr. Merriam believes that they do not fly long after sunset.

Their flight is slower and more erratic than that of our other bats, yet they sometimes make considerable trips over the sea. On September 6, 1907, Mr. Murphy rowed before daybreak four or five miles off shore from Sandy Hook in search of Mother Carey's Chickens (*Oceanites oceanicus*). An east wind was blowing from the open ocean, heavy storm clouds hung low on the horizon, and over the choppy water the birds sought were scurrying everywhere. And here, too, despite the gray, blustery morning, a number of small bats were struggling toward the Staten Island shore, flying about a gun-shot above the sea. Although he failed to kill one, he has little doubt that they were Silver-hairs.

This species is highly gregarious, individuals congregating by the score in favorite spots, especially during inclement weather. Vessels at anchor often furnish them napping places through the day: a furled sail may harbor a dozen of them, and in the basin in Port Jefferson Harbor Mr. Murphy has known of their being found in the hulls, cabins and canvas covers of yachts. Last January at the same place, one captain threw overboard more than twenty torpid "black bats," thinking them dead.

In Prospect Park, Brooklyn, Silver-haired Bats gather in large numbers in late summer, and on calm afternoons they begin to fly over the Park Lake long before sunset. Oftentimes a dozen of them are seen zigzagging in and out among a flock of nighthawks, when there can be no doubt that the prey both beasts and birds are devouring is mosquitoes from the swarms dancing over the lake.

Dr. Merriam found, on having winged specimens fall into the water, that Silver-haired Bats swim strongly.

3. LARGE BROWN BAT

Vespertilio fuscus (Beauvois)

Length 11.75 centimeters (4.60 inches). Teeth: incisors $\frac{2-2}{2-2}$, canines $\frac{1-1}{1-1}$, premolars $\frac{1-1}{1-1}$, molars $\frac{2-2}{2-2}$, = 32. Above dark brown, below dark buffy gray. Flight membranes naked. Ear moderate.

The Brown Bat is not uncommon on the western end of Long Island, especially in the large parks and cemeteries of Brooklyn, but throughout the rest of the island it is generally not common.

They fly later in the year than most of our bats, and are said to come out sometimes on mild evenings even in mid-winter. They hibernate abundantly within city buildings. The authors have seen many specimens taken in Brooklyn houses and church steeples. One sent to the senior author last winter was evidently an aged animal, for the teeth, once crowned with needle-like cusps, were worn to short, rounded stumps. Surely any creature with more enemies than a bat would be weeded out by nature before it had reached such decrepitude. About the tall tower of the artesian well in Prospect Park many of them may be seen late on summer evenings, and within it they probably hide themselves throughout the day. They do not appear until dusk, and then they hunt well into the night.

Like many other species, the Brown Bat is much given to feeding over water. It also hunts about street lights. One was seen about ten o'clock in a night early in November, flying round and round at great speed under an arc light and circling in exactly the same orbit for twenty-five minutes. Probably few or no insects were flying at the time; the Bat was merely "making speed" in a ring perhaps forty yards in diameter. A stick was held up in its path, but it dodged to one side and then went directly on in the same circle.

4. RED BAT

Lasiurus borealis (Müller)

Length 11.25 centimeters (4.40 inches). Teeth: incisors $\frac{1-1}{1-1}$, canines $\frac{1-1}{1-1}$, premolars $\frac{2-2}{2-2}$, molars $\frac{3-3}{3-3}$, =32. Color usually tawny, sometimes grayish, more or less tipped with whitish. Upper surface of the interfemoral membrane, base of wing membranes and base of ears furred. Ear short.

During most of the summer a bat seen anywhere on Long Island is, nine times out of ten, a Red Bat. The species is abundant from the busy streets of Brooklyn to Orient and Montauk, between the first warm spring days and the twilights of October. On mild afternoons they fly even later in the year and there is a Staten Island record for December 5. They appear a little before or after sunset, according to weather conditions, and feed on various crepuscular insects, among which beetles, certain gnats and flies, and even the larger night-flying moths have been identified.

The Red Bat is a typical migratory species. Its range extends from Canada to the tropics, and westward across the continent, although it is not found throughout this whole region at any one season. Probably it does not reach the northernmost portion of its range until August, "when the long intense twilights which would be unsuitable to its habits, have ceased."* Coming south in autumn, it makes long flights across country or down the coast. During October many individuals have been found swinging asleep from exposed roots under the overhang of the beach cliffs which fringe the north shore of Long Island, and in all likelihood most such were migrants which had made the journey across the Sound.

With its fox-colored coat, this species is the most readily recognized as well as the commonest on Long Island. Its fur is exquisitely soft, fluffy and dry, without any trace of the oily finish of cave bats' fur, for the Red Bat lives chiefly in the open and sleeps among green leaves. There is much individual variation in the general shade of pelage, some being tawny while others range to rich auburn, but almost invariably the long hairs of the back are tipped with gray. The suckling young are paler than the adults and have short hair.

When first coming out from their diurnal berths in the forests and groves the Red Bats fly high and sail leisurely down or across the wind, tacking like a ship if they would go against it. Frequently they wheel and double in their course, making sallies for chance victims to their appetites. No bird, not even the swift, is half so agile. If a strong breeze be blowing, they soon descend near the ground; but otherwise they are likely to fly well up in the air until dark. They do not commonly become quiescent at nightfall as many other kinds of bats are believed to do. On the contrary they often whirr past one along a country road three or four hours after sundown, and they are seen hunting about village arc lights all through the evening up to midnight and after. At ten o'clock one August night several were caught in a butterfly net as they swept under such a light. From a long series of observations, the conclusion has been reached that these bats frequent the neighborhood of lights mainly when food is scarce elsewhere. For instance, they are seldom seen about the lights after fair summer days when insects swarm over the meadows. On the other hand, following heavy rainstorms, Red Bats in considerable numbers frequent the lights, whither the scattered insects are attracted, and on evenings when a gentle driz-

*C. H. Merriam.

zling rain is falling one may see half a dozen of them maneuvering within the rays of a single electric globe. Not infrequently they fly through open windows into lighted rooms, to the consternation of any women who may be present and who fear the bat may become ensnared in their hair, a deep rooted though probably fanciful tradition.

The fact that the Red Bat under the right circumstances, seeks a sphere of bright light for its foraging does not signify that the animal needs or desires to *see* its prey. Indeed, experiments have shown that insectivorous bats rely very little, if at all, upon sight. They fly, and avoid obstacles, with unimpaired skill after their eyes have been totally destroyed, and it is principally their acute hearing, together with a tactile sense developed to a degree almost beyond human comprehension, which enables them to perceive and locate flying insects. Street lights are centers where insects congregate, and the food, not the light, is the magnet which draws the bats. With all their ability in aerial gymnastics, they do not always capture their lively morsels at the first swoop. From the shadow of some dense bushes a Red Bat has been seen to make ten unsuccessful attempts to catch a small white moth under the full glare of an electric light. The Bat would dash at the glittering miller and strike it with a vicious snap of the teeth, but failing to seize it, would recover quickly and strike again, all the while uttering a low chuckling sound quite different from the ordinary shrill chatter.

Sometimes Red Bats fly so low that it is an easy matter to collect them with a horse-whip or bamboo pole. In Brooklyn streets they have been seen even skimming the sidewalks and actually brushing past the feet of throngs of pedestrians. They know nothing of fear, for bats, having been practically without enemies for such a long period in their evolution, have lost that instinct which is so strongly developed in other vertebrates. It is most astonishing, yet perfectly normal, to see a Red Bat after being shot at and missed, dive toward the ground in pursuit of the cartridge wad, and rise nearby, a mark for the second barrel. They are so thoroughly protected both by their habits and their odor that they have few foes to fear. Very rarely a bat skull may be found in an ejected owl pellet, and they have been known to be caught by cats, but cats will not eat them.*

*"Bats have been found in both owl and hawk pellets a number of times, but only rarely in hawks'. They have been found also in the stomachs of large trout, and it goes without saying that they are sometimes discovered and eaten by some of the smaller predatory carnivores."—C. H. Merriam, *MS.*

Red Bats are truly swift fliers, capable of attaining a straight-away velocity of perhaps eighteen miles an hour. Ocean Avenue, in Brooklyn, is one of their favorite haunts, as it is also a favorite boulevard for motorists; and here, on summer evenings, Mr. Murphy has seen bats overtake and leave behind the automobiles beneath them. In many cases they seemed to go twice as fast as the machines and there is reason to believe that very few of the latter were within a speed limit of eight miles per hour.

Red Bats not only feed on the wing, but carry on even their mating while they fly. An instance of the copulation of this species in the air was recorded many years ago as having occurred in Massachusetts during the month of October. Many recent writers, however, having no corroboration of the incident, and realizing that other bats mate in a different manner, have declined to accept the original observation as correct. There is, nevertheless, no doubt of the truth of it. In the late afternoon of August 6, 1911, Mr. Henry Thurston, of Floral Park, Long Island, saw two Red Bats join in flight. One of them made several attempts to alight upon the other and, finally succeeding, they remained together about half a minute, flying unsteadily the while, with all four wings beating. On the following evening at the same place Mr. Thurston shot two when they were apparently attempting the act of coition. This pair came into Mr. Murphy's hands next day. As is usual, the female was somewhat larger than the male. On August 23, at Floral Park, Mr. Murphy saw two Red Bats act in a similar manner, although in this case they remained joined only a few moments, and passed out of sight as they parted. Other observers, among whom Dr. A. K. Fisher of Washington is one, have since then related to him instances from their experience confirming the deduction that aerial copulation is the rule with this species. It would seem, moreover, that the mating season begins earlier than with most bats.

The young are found clinging either to the mother or to the trunks or branches of trees where they have been temporarily abandoned. They number usually two or three, but litters of four are not unknown, and still more rarely only one is born. The mothers show much solicitude for their offspring, and have been known to pursue and alight on persons who were carrying the babes away.

After all, how little we know of our nearest neighbors! Red Bats flutter about our heads on summer nights, and we dodge; they

fly into our houses and we mercilessly beat them down; they migrate to our neighborhood in spring, when bird-lovers are all expectancy for even the most familiar of the feathered kind, yet our equally fascinating, equally useful, furry little *chauve-souri* is not thought of. He lives unto himself, earning his subsistence when most of the world is still, and by day he is slumbering in the woods or in the alders over our streams.

5. HOARY BAT

Lasiurus cinereus (Beauvois)

Length 13.75 centimeters (5.40 inches). Resembles the Red Bat but is larger, and mottled with brown, buff and white, white predominating below.

The Hoary Bat is a migratory animal, with a range extending well into the interior of Canada, and up the coast as far as Newfoundland and Labrador. Largest and most beautiful of all our species, it is a rare mammal, both on Long Island and elsewhere. On Long Island it has been taken in August, September and October.* One October a specimen was secured by Mr. Arthur H. Helme at Miller Place, where the bat had crept under a driftwood plank on the Sound Beach. Another was captured alive at Floral Park, August 19, 1911.

Little is known of the life history of this species. The best account of its habits is that given in the "Mammals of the Adirondack Region," by C. Hart Merriam, who has been more fortunate than most naturalists in opportunities for studying it.

It seldom comes forth from its arboreal retreats until dark, and it is the strongest and swiftest flyer among all our representatives of its family. Beyond these meager statements we can make no generalization concerning it, though presumably many of its ways are like those of the Red Bat, which it most resembles.

It was on the morning of August 19, 1911, that Mr. Murphy first made the acquaintance of a living Hoary Bat. He had been warbler hunting near Floral Park, Long Island, since sunrise, when, entering a copse of dense second growth about eight o'clock, he presently saw a gray oblong with no projections or irregularities, suspended about four feet above the ground from a chestnut sprout. A step nearer revealed the identity of the oblong. It hung from

*G. S. Miller, Jr., Preliminary list of mammals of New York, in Bull. N. Y. State Mus., VI, 1899, No. 29.

the toes with its wrists over its eyes, and little waves were crossing the soft fur in the morning breeze. He reached toward it cautiously, but its ears were quick, and suddenly dropping to the ground it lay with great wings spread to their fullest extent while it raised its impish head with mouth wide open, and chattered angrily as he threw his hat over it. On the way home it was active and pugnacious, continually attempting to bite, but it calmed down when put into a box with door of fine wire mesh. In this cage, after a few branches had been introduced, it spent the greater part of the last six weeks of its life.

It was an adult male, and was very fat. During the first few days of its incarceration it made frequent tours all over the box, crawling laboriously round and round the four sides, and back and forth across the floor. Thereafter it hung head downward on the wire door most of the time, but whenever the door was faced toward a sunny window the bat would soon crawl down, shuffle into the farthest corner, and lie flat on the bottom of the cage. It never would hang from the branching twigs tacked up for it, and when placed upon one of them, it would climb deliberately down, using its thumbs, mouth, and feet as aids, and would return to the wire netting. During its slumbers, which often endured for hours without sign of life, its temperature sank so low that it felt clammy and dead, but on Mr. Murphy's enfolding it with his hands, respiration would soon become perceptible, its body would grow warm while the heart-beat quickened to a rapid flutter, and within a few minutes the little beast thus weirdly restored to activity, would shake its wings, blink its tiny eyes, and grasping his fingers with its thumbs, would gnaw his knuckles, *precisely in the manner of a playful kitten*. It never attempted to fly from the open hand even when it was most active.

The coming on of evening seemed to have no effect on rousing the captive to normal liveliness. In fact, on only one occasion was it seen moving about at night, and this was when two restless Red Bats had been placed in the same cage. Both Red Bats were dead next morning. A careful examination showed no marks of violence on their corpses, and no one was accused on circumstantial evidence, but two more Reds, placed in the cage on another date, were likewise dead on the morrow.

About nine o'clock in the morning the Hoary Bat was usually, though not always, active of its own accord, and at about this time of

day was frequently watched making its toilet, an elaborate operation. It combed the fur of its head and neck with its sharp curved claws by passing either hind foot over the shoulder. Then it licked its back, flanks, and handsome collar, and the hairy patches on its wings, spreading its black membranes repeatedly, and making grimaces with its mobile, curious nose and lips. All this it would do either on the wire door or while clinging upright on a proffered index finger. In the latter position it also would drink water, taking two or three laps with its tongue, then raising its mouth, chicken-like, to swallow.

Within a few days after the capture, some meal worms were procured to feed the unusual pet. It paid no attention to the worm held before it until the wriggling larva actually touched the face. Then it snapped the insect from the fingers and began the process of mastication, long and painful to behold! No coaxing was needed after this. The bat reached viciously for everything held before it, squeaking the while in notes so high that they well might have been above the range of some low-pitched mortal ears, and fifteen good sized meal worms followed the first within ten minutes, a performance which the bat equalled only once again, although several times it ate ten at a meal. The brute's procedure was to seize a worm, pass it rapidly from end to end through its teeth until all wriggling had ceased, and then to chew it rapidly, thoroughly, and loudly, with many an uncouth smack of the lips, until the end of the victim gradually passed from view. It would eat two worms at a time, one hanging from either side of its mouth, and would attempt to seize even a third. Once satisfied, it would pay no attention whatsoever to further profferings of food. It would eat beetles whole, chopping the elytra into tiny fragments. Moths it also devoured with avidity, dropping the wings, however. If the victim were large and powerful the bat would use its interfemoral membrane, thumb-joint, the sides of its body, or its support to aid it in securing a better grasp. House flies it would seize, but would immediately spit them out again, and it never would touch a dead insect. Invariably within a few minutes after eating it exuded a few drops of dark yellow urine.

Several times the Bat was given the freedom of a large room in order that its splendid flight might be observed. When placed on the floor it would spring into the air without the slightest difficulty, and circle round the upper walls easily and gracefully, but as a rule after a few turns it dropped to a piece of furniture and clung there.

Observation and experiment stopped on October 1 when, after having lived six weeks in confinement, the bat was found dead in its cage.

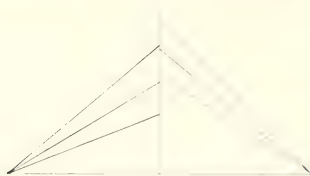


Diagram of convexity

Acmaea testudinalis

Acmaea fergusoni



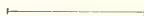
1st row, worn



20th row



60th row



0.5 mm.

Scale: C. Wheat

WHEAT: LONG ISLAND ACMAEA

THE MUSEUM
OF
THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

SCIENCE BULLETIN

LONG ISLAND FAUNA AND FLORA—II.

A LONG ISLAND *ACMAEA* AND A NEW VARIETY OF
UROSALPINX CINEREA.

By STEPHEN C. ADLER.

Acmaea fergusonii sp. nov.

SHELL patelliform, outer surface gray or greenish, eroded almost to the margin, below the eroded area sometimes plain, sometimes mottled with reddish brown on a pale background; base oval, altitude more than two-fifths of the mean diameter; apex laterally compressed, blunt, directed forward, between three and four-ninths of the entire length behind the anterior margin; sculpture consisting of fine concentric lines with an occasional coarse undulation, and of fine, irregularly spaced, radiating wrinkles, the latter often obsolete or entirely wanting, always more distinct on the posterior half; anterior slope straight, incurved under the apex in perfect specimens; posterior slope convex; aperture oval, coextensive with the base, widest behind the middle; margin simple, sharp, with all points in the same plane; within polished, moderately thickened, when fully matured heavily thickened immediately below the scar; color varying from pure white through tints of rose or blue to dark mahogany or blue-black, rarely unicolored, generally either mottled or with several shades arranged in zones, the center and the margin usually darker; cicatrix continuous, very narrow over the head, widened upward at the neck.

Foot large, orbicular, white, the dark visceral mass faintly showing through it at the center; a white collar of muscle extending upward from the foot through the mantle and adhering to the shell, mantle thin, greenish, apiculate at the margin, completely encircling the animal; tentacles subulate, long, white; a small black eye-spot on the outer side of the base of each tentacle; ctenidium slender, plume-like, attached by one end in the cavity above the neck and extended more than half the length of the body down the right side between the foot and the mantle.

RADULA longer than the animal, slender, with six teeth in each row, formula, 3.0.3 or 1.1.1.0.1.1.1. The teeth are flatly compressed, pointed, scarcely curved, destitute of serrations or accessory cusps. The first pair or centrals, are tall, narrow, round-pointed, erect or slightly recurved, close together, transverse to the radula, the amber-colored bases not wider than the cusps. The second pair, or laterals, are as long as the first, nearly twice as wide, and stand oblique to the radula, their inner margins in advance of the outer and but little farther apart than the first pair, not curved but directed backward. The third pair, or uncini, are very small, erect, facing inward.

Types from the north shore of Long Island, N. Y., in the Museum of The Brooklyn Institute of Arts and Sciences, Accession No. 12656.

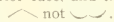
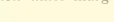
Recorded localities:—DeKay: Zoology of New York, Part V., Mollusca, 1843, p. 162. "This shell, which is found along our northern coast, is now determined to be identical with the *P. testudinalis* of Europe." Doubtless the coast of Long Island is here intended.

Smith and Prime: Report on the Mollusca of Long Island, Ann. Lyc. Nat. Hist., N. Y., IX., 1870, p. 392. "*Tectura testudinalis*, Gray. Glencove (Ferguson), Huntington, Greenport, Little Gull Island."

Balch: List of Marine Mollusca of Coldspring Harbor, L. I., Proc. Boston Soc. Nat. Hist. XXIX, 1899, p. 140 (No. 7). *Acmaea testudinalis* (Müller). "One shell, empty but fresh."

Living specimens were found by the author at the north end of Centre Island (Coldspring Harbor) 1901 and 1902; in Port Jefferson Harbor 1912; at Sands Point (Port Washington) 1913; at Wading River 1913.

This *Acmaea* differs from the species living on the coasts of Maine and Nova Scotia in geographical range, habits, size and form of the shell, and in the form of the teeth of the radula.

The radula differs from that of *testudinalis* as figured by Jackson in the Nautilus, XXI, 1907, *pl. 2, f. 1*, the centrals being less curved and having smaller bases; the laterals being less curved, not noticeably arcuate on the anterior face, and their inner margins in advance of the outer margins, thus  not .

More than twenty radulas from specimens taken at Wading River, and ten from Sands Point specimens have been examined. In number and position of the teeth all are uniform. The radula from an animal whose shell measured 20 mm. in length was 23 mm. long, 0.5 mm. wide and had four rows of teeth to the millimeter. The growing, or posterior end, contained only square transparent plates. A few rows from the end these plates bore transparent filaments, appearing like empty sacs, slender in form but about as long as the full-grown teeth, and almost as wide at the base. These soon fill with a very dark substance, stand erect and transverse to the axis of the radula, the centrals in contact almost to the apex, the laterals but slightly separated. At about the middle of the radula the teeth become golden yellow edged with mahogany; the small amber bases become covered with a pale yellow callus uniting those of each row into one mass on either side of the median

line. A lenticular gape appears between the laterals caused by a curling of these enlarged bases. This curling gives the laterals an oblique position and causes them to point outward and backward. At the anterior end of the radula three or four rows of teeth are badly worn, each succeeding row being less abraded than the one before it. The fifth row usually is perfect.

Compared with *A. testudinalis* the shell is smaller, more convex, less elongate and less variable in form. Some of the Wading River specimens have the base almost round. The average convexity is approximately one-third greater than for *testudinalis*, or as 4 to 3. The index of convexity, or quotient of the altitude by half the sum of length and breadth, was obtained for 40 shells from Long Island. The lowest was 0.3333, the highest 0.5172, the average 0.41618. The average index for 40 *A. testudinalis*, from Maine and the Bay of Fundy (34), Greenland (3), British Islands (3), was 0.3128, the highest 0.4285 and the lowest 0.2040. Of the 40 Long Island shells 29 differed from the average convexity by less than ten per cent, and only one by more than twenty per cent, while only 22 of the more northern shells were within ten per cent of the average and five were more than twenty per cent from it.

In point of size the northern shell has five or six times the capacity of the Long Island shell. Mature shells from the Bay of Fundy measured across the base (aperture) are twice as long and almost twice as wide as our shell; but in altitude they are only one-third to one-half greater.

MEASUREMENTS OF SPECIMENS
FROM BAY OF FUNDY.

Alt. l. & br. of base

14.	43	x	33	mm.
12.	39.5	x	29.5	
11.	37	x	29	
11.	37	x	29.5	
8.	31	x	23	
5.	22	x	19	
7.	31	x	24.5	
9.	33	x	29	
10.	39	x	28	
11.	36	x	28	

MEASUREMENTS OF SPECIMENS
FROM LONG ISLAND.

Alt. l. & br. of base

7.	20	x	16	mm.
7.	17	x	13	
7.	19	x	15	
8.5.	16	x	16	
7.5.	18	x	16	
4.	10	x	8	
5.5.	14	x	12	
6.	15	x	12.25	
6.5.	17	x	14.5	
7.	17	x	14	

According to Wilcox, "on the Massachusetts coast a limpet an inch long is a giant but at Eastport they not rarely reach a length of 32 mm." In Massachusetts all are equal in size and small. In the absence of specimens it is impossible to determine whether this small form living north of Cape Cod is identical with the Long Island form.

The animal is active, moving freely over the surface of stones and shells, feeling the way in advance with its tentacles which are extended fully half their length beyond the margin of the shell while moving. The foot seems to be equally adapted to moving in all directions. It simply pushes outward on the side toward which the animal wishes to move, and the other parts follow. The shell generally is elevated slightly to permit free use of the tentacles and for the circulation of

water over the gill, the mantle margin with its row of minute fleshy points showing beneath it. One animal crawled up the side of the aquarium two or three inches above the water and rested there several hours.

The jaws and radula are kept in constant motion, the mouth dilating and contracting in rhythm with the radula which runs forward with a decided stroke, then returns and again advances. These movements are easily observed as the animal crawls over the side of the jar, or still better, on a piece of window-glass held in the hand.

According to Morse *A. testudinalis* is sluggish in habits, occurs in pools at low tide exposed to dashing waves, remains fixed for hours; and he says: "and only in the extreme young have I seen considerable freedom of motion."

Not being able to obtain the animal of the large *Acmaea* from Maine, my comparisons are based upon the shells, and upon the papers by Jackson, Morse and Wilcox.

The name is for the late David W. Ferguson (*Nautilus* XXII, 1909, p. 124) who, according to Smith and Prime, found the shell at Glencove, Long Island, prior to 1870.

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Morse: An early stage of *Acmaea*, *Proc. Boston Soc. Nat. Hist.*, 34, 1903, pp. 313-323.

Urosalpinx cinerea var. *aitkinae* var. nov.

SHELL differing from typical *U. cinerea* in color which is pure white or rarely with a pale flesh tint within. Two of ten specimens are faintly tinted; the others are all glistening white within, and of a dead white on the rough exterior. Animal not observed.

Types from rocks in Hempstead Bay, Long Island, June 27, 1913, found living by Miss Helen J. Aitkin of the Central Museum, in the Museum of The Brooklyn Institute, Accession No. 12657.

Other specimens taken in the same locality are dark purple within, the majority of them spirally banded, having two yellowish zones separating the purple into three zones one of which is peripheral.

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LONG ISLAND FAUNA AND FLORA.—III.

THE FROGS AND TOADS Order SALIENTIA

BY FRANK OVERTON, A. M., M. D.

Frogs and toads belong to a class of animals that is often called Amphibia, from two Greek words meaning "double life," referring to the ability to live either on the land or in the water. Since many mammals, such as beavers and muskrats, are markedly amphibious, the Amphibia are more correctly called Batrachia, from the Greek βάτραχος, frog. The batrachians are divided into two orders; the Urodela (Gr. οὐρά, tail), or salamanders, in which the tails are retained in adult life; and the Salientia (Lat. *saliens*, jumping), or frogs and toads, in which the tails are lost in the adult forms.

DISTINGUISHING CHARACTERISTICS. Batrachians form a class which is in many respects intermediate between the reptiles and the fishes. A distinguishing feature is that the bodies of most newly hatched reptiles and fishes are adult in form, while the bodies of batrachians undergo a metamorphosis or marked change before they acquire their adult forms. The skins of most reptiles and fishes are scaly, while the skins of batrachians are only exceptionally scaly. Adult batrachians are further distinguished from fishes by the presence of legs instead of fins. Tadpoles are distinguished from fishes by their large heads, and by the absence of bony rays in their fins.

Among the batrachians, the Urodela (salamanders) have tails, elongated bodies, and their legs are all nearly equal in size. Among the Salientia (frogs and toads), the adults have no tails; their bodies are short and stout; their fore legs are short and small; and their hind legs are long and large, and are well fitted for jumping or swimming.

The popular idea of the difference between frogs and toads is that frogs live in the water and toads on the land. Some frogs spend the most of their time on the land away from any body of water; while toads spend days and weeks in the water during the breeding seasons, and during that time they dive and swim as expertly as frogs. The dif-

ferences between frogs and toads are founded principally on details of their internal structures which cannot be seen by an external examination.

LIFE HISTORY. All Long Island batrachians are born in the water, and are hatched from eggs that are laid by their female parents. A young batrachian is called a tadpole, from *tad*, toad, and *poll*, head, for it appears to consist of a head and tail and no body. Tadpoles live the lives of fishes beneath the surface of the water during the first few weeks or months of their lives. They then acquire lungs and legs and become fitted to live on land. Salamanders closely resemble frogs and toads in the egg and tadpole stages of their existence; but by far the most of the tadpoles in Long Island pools are the young of frogs or toads.¹

EGGS. Frogs and toads hibernate during the winter. Most kinds of frogs burrow in the mud of ponds at the beginning of cold weather. Toads burrow in loose soil. Almost their first act on emerging in the spring is to resort to pools in order to lay their eggs. A female frog or toad usually lays several hundred eggs. The eggs are mostly brown or black, and are about the size and shape of small pinheads. Their gelatinous coatings soon absorb water and the eggs become as large as small peas. The result is that the mass of the eggs laid by a single animal may almost fill a pint measure. The eggs may often be found floating in masses as large as a hat.

VOCAL SOUNDS. All kinds of frogs and toads have voices which may occasionally be heard all through warm weather. But from the time of a spring thaw until well along in June, every marsh resounds with their voices, which may be called noisy or musical, according to the opinion of the listener.

Most persons are acquainted with frogs and toads chiefly from hearing their voices. Nearly all the sounds made by animals in the early spring are the voices of frogs and toads. Birds take up the chorus in early summer. Grasshoppers and crickets constitute the orchestra in the autumn. The silence of a winter's evening is in striking contrast with the animate sounds of the warmer months. But when the ice has disappeared from the pools, tiny tree frogs begin the spring music with shrill peeps, and they are soon followed by the frog croakers with their deep bass notes, and the toads with their monotonous chants.

¹ Salamander tadpoles differ from frog and toad tadpoles in the presence of external gill filaments. The gills of larval frogs and toads are concealed. Ed.

The performers among frogs and toads are males, and their sounds are serenade notes as they call to their mates. Perhaps they try to outdo one another, for when one starts to sing, the rest of those in the marsh often join in and submerge his voice in a noisy hubbub. The time to become acquainted with frogs and toads is during the breeding season. At that time all the adult frogs and toads within half a mile of a marsh congregate in the water, and betray their presence with their voices.

VOCAL SACS. The chorus from a marsh may readily be heard over half a mile on a still night. This is due to the fact that each batrachian performer either distends the underside of its throat into a balloon, or else it puffs out pouches in its checks and neck, and thus forms a sound-box which magnifies the sound. An animal about to sing swells its body full with a deep breath, and then forces the air into its throat pouch with a violent contraction of all the muscles of its chest and abdomen. It sings with a closed mouth, and can make its sound under water as well as above it.

INFLUENCE OF TEMPERATURE. Frogs and toads are sensitive to the temperature of the air. The first singers in the spring will begin while ice is still left in shady parts of their pools, provided the temperature of the air is warm. If the temperature of the air drops below 60° F., only a few will sing. If the temperature is below 50° F., the marshes will be practically silent.

SONGS OUTSIDE OF THE BREEDING SEASON. The breeding season for common toads is usually over by the middle of May, but numbers may be heard singing in the pools at Patchogue, L. I., up to the middle of August. These are belated males, calling in vain for mates who do not appear.

On July 21, 1912, the first hard rain fell after many weeks of drougth, and filled an excavation on a high hill at Middle Island, about a quarter of a mile from a pond. The pool was about 25 feet in diameter, and occupied a site that was formerly used as a drinking place for cattle, but it had been absolutely dry for several seasons. On the evening on which the pool formed, numbers of frogs entered it and sang. The sounds were so loud and so unusual in that locality, that they disturbed the sleepers in a nearby house. As nearly as could be determined from the description given by an intelligent school teacher who heard them, the sounds belonged either to green frogs or to leopard frogs. On the twenty-eighth the excavation was nearly dry, and in the mud there were over a

hundred small tadpoles that had just died. Here was an instance of the breeding season delayed for a month or six weeks, probably on account of the lack of a suitable pool.

The summer of 1911 was exceptionally dry, but large quantities of rain fell during the last week of August, and flooded the salt meadows around Patchogue to a depth of several inches. The last hard rain fell on September first, and on that evening frogs swarmed over the ground at the edges of the salt meadows, and sang in a chorus that was described to me as being far more noisy and persistent than the spring chorus had been. The frogs also paired together, as in the breeding season. I was first informed about the chorus on September sixth. I went at once to the meadows and found that the sounds were made by green frogs and leopard frogs. The chorus sounded almost as loud as in the spring, but I was told that its volume was far less than it had been a few days previously.

THE WANDERINGS OF FROGS. Frogs are supposed to be strictly water animals, yet they sometimes wander far from their pools. The Long Island Rail Road experimental farm is located east of Medford, about two miles from the nearest marsh or body of water, and is surrounded with dry woodland. When a swimming pool was built on the property, numbers of wood frogs promptly made it their headquarters, and with them there came several green frogs. Marsh frogs have been found in the dry woods with sufficient frequency to justify the assertion that they sometimes wander far from their pools.

HOW TO FIND FROGS AND TOADS. Frog and toad orchestras perform only for their own edification. They resent intruders and sulk in silence at the first intimation of observation or applause. Few persons ever see a frog or a toad in the act of singing, although nearly everybody has a vague notion that the sounds coming from marshes in the spring are frog songs. But there is no difficulty in observing any kind of frog or toad during his vocal performance. Go out after dark with a bicycle lamp, and walk slowly and quietly up to the source of the sound. The only persons who cannot find the animals by this method are those who cannot locate the direction from which the sound comes. A frog or a toad does not mind a light, or the sound of low talking, but it is affected by a slight jarring of the water. If every motion of the feet is made gently and deliberately, the animals will show no signs of alarm on the near approach of a light, but will allow themselves to be observed and photographed. They will not even wink an eye when a powerful flashlight is set off within two feet of them.

Frogs and toads sometimes sing in a loud chorus during the daytime when they first appear, but a little later they rarely sing except at night. Their sight is keen, and great patience is needed in approaching them in the daytime without frightening them into silence.

The illustrations that accompany this monograph are reproductions of photographs taken by the author. All the subjects were wild frogs and toads in their natural pools and amid their undisturbed surroundings. Nearly all of them were taken at night, by flashlight.

LIST OF FROGS AND TOADS OF LONG ISLAND. Ten species of frogs and toads, belonging to four families, are distributed over Long Island.

Family Bufonidæ (Lat. *bufo*, toad).

1. *Bufo fowleri*. Common toad. (Named for Mr. S. P. Fowler, of Danvers, Mass., who first observed the habits of this species).

Family Pelobatidæ (Gr. *πηλο-βάτης*, mudwalker).

2. *Scaphiopus holbrookii*. Spadefoot toad (Gr. *σκάφη*, spade; *πούς*, foot. (Named for Dr. J. E. Holbrook, 1793-1871, an American herpetologist).

Family Hylidæ (Gr. *ὕλη*, forest).

3. *Acris gryllus crepitans*. Cricket frog. (Gr. *ἀκρίς*, locust; Lat. *gryllus*, cricket, *crepitans*, rattling).
4. *Hyla versicolor*. Common tree frog. (Lat. of changeable color).
5. *Hyla pickeringi*. Spring peeper. (Named for Charles Pickering, 1805-1878, an American naturalist).

Family Ranidæ (Lat. *rana*, frog).

6. *Rana pipiens*. Leopard frog. (Lat. peeping).
7. *Rana palustris*. Pickerel frog (Lat. *palustris*, marshy).
8. *Rana sylvatica*. Wood frog (Lat. *sylvæ*, forest).
9. *Rana clamitans*. Green frog. (Lat. calling loudly).
10. *Rana catesbiana*. Bull frog. (Named for Mark Catesby, 1679-1749, an English traveller in America).

ARTIFICIAL KEY

- a.* Discs on ends of toes The tree frogs.
b. Toe discs large.
 c. Skin smooth; color brown..... *Hyla pickeringi*.
 c' Skin granular; color gray..... *Hyla versicolor*.
b' Toe discs small; toes webbed..... *Acris gryllus crepitans*.
a' No discs on ends of toes.
 d. Parotoids (glandular bodies behind ears)
 present..... The toads.
 e. Pupil of eye horizontal..... *Bufo fowleri*.
 e' Pupil of eye vertical..... *Scaphiopus holbrooki*.
 d' Parotoids absent..... The frogs.
 f. Back distinctly spotted.
 g. Under parts entirely white..... *Rana pipiens*.
 g' Hinder under parts yellow..... *Rana palustris*.
 f' Back not distinctly spotted.
 h. Ear smaller than eye..... *Rana sylvatica*.
 h' Ear as large as or larger than eye.
 i. A prominent ridge on each side of
 back..... *Rana clamitans*.
 i' No ridge on back..... *Rana catesbeiana*.

1. COMMON TOAD

Bufo fowleri Putnam

Length of body 6.3 to 7.66 centimeters (2.50 to 3 inches). Body stout, back covered with small warts. Parotoid glands behind the eyes long and prominent. Prevailing color above, gray with irregular black spots, sometimes dark brown or black, rarely reddish. Under parts white and unspotted. Throat of male black.

Every Long Islander knows the common hoppy-toad, although the dictionaries do not recognize the animal by that name. But, on the other hand, no native Long Islander would recognize a toad from the definition given in the Standard Dictionary, "An arciferous, tailless amphibian, especially a bufonid."

A toad is popularly supposed to live only on dry ground, but during the breeding season it becomes as truly a water animal as any frog. On the evening of April 28, 1911, the toads in the south part of Patchogue, L. I., suddenly appeared after their winter's sleep, and great numbers of them were seen hopping across a stretch of dry salt meadow toward some open pools. In the morning no toads could be seen on the meadow, but the pools were full of them, while numbers of disemboweled bodies lying on the meadows showed where the night owls had taken toll from their numbers. No such migration occurred in 1912, 1913, or 1914, but in

these years a few were heard about the middle of April, and their numbers, increased gradually until about May first, when the full chorus was singing.

A male toad is a persistent singer during its stay in the water. Its song is a combination of a low whistle and a moan, and the two sounds do not melt into a chord. The combined sound is discordant and decidedly unpleasant to a musical ear, but at a distance the sound is more pleasant, for the moan is not apparent and only the whistle is heard. The sound lasts from two to three seconds, and may be repeated at intervals of about ten seconds. In 1911 many sang in the daytime but in 1912 and 1913 very few were heard except at night.

The common toad of the mainland of New York State is called *Bufo americanus*. Its song is a sweet, trilling whistle, and may be imitated by whistling in a low monotone with drops of water held between the lips. Each individual song is prolonged for about thirty seconds. The prolonged song of the American toad is a ready means of distinguishing it from the short song of the common toad (*foaleri*) of Long Island.

During its song the common toad distends its throat in a pouch about as large as its head. It sings while sitting still, usually in shallow water. It will retain its position for many minutes and even hours if it is not disturbed. It may be photographed with greater ease than any other batrachian. A toad may frequently be seen distending its vocal sacs, but giving forth no sound. These voiceless toads seem unaware of the pantomime that they are enacting, and they go through the motions of their songs with as much grace and vigor as their noisy companions.

By far the greater number of tadpoles that are ordinarily found in pools are the young of toads. Toad tadpoles may be found in shallow pools in nearly every marsh all through the months of May and June. About the first of July they lose their tails and acquire their legs. They then leave the water and, although they are tiny creatures, they swarm upon the land in such numbers that the story of the Egyptian plague of frogs in the time of Pharaoh seems true to nature. The young toads are tender, and cannot long survive in a dry place. They will be dead and dried up in the morning after a night's confinement in a box, unless they have wet soil in which they can burrow. They therefore remain hidden in the cool grass and under damp leaves through the day, but they go forth upon open paths and roadways in countless swarms in the evening, especially after a shower. Their source is not the clouds, as is often supposed, but the nearest pool of water.

The skin of a toad is covered with projections that are like smooth warts. The two largest ones are situated behind the eyes and are called the parotoids. The projections contain glands which produce an acrid juice. A toad is not at all poisonous, and its touch cannot produce warts or any other kind of skin trouble. But the taste of the secretion of its skin glands is evidently unpleasant to dogs. A puppy that once grasps a toad will quickly drop it with evident distaste, and will not touch one again with its mouth. But some snakes prefer toads to any other kind of food. If it were not for snakes and other natural enemies, toads would overrun the land to an extent that may be imagined after seeing the numbers of young that appear after a Fourth of July rain.

A toad is one of the farmer's best friends. Watch a toad in the early evening while it hunts for flies around the doorstep and frequently gives low peeps of pleasure. Its appetite is insatiable, and its aim unerring as it darts out its tongue and seizes the unsuspecting flies. It is also fond of cutworms and other crawling things that destroy garden vegetables.

2. SPADEFOOT TOAD

Saphiopus holbrooki Harlan

Length of body 6.3 to 7.6 centimeters (2.5 to 3 inches). Body stout and covered with very fine tubercles. Parotoid glands round. Head short and wide. Eyes prominent and very retractile. Pupils vertical. Color above, dark brown streaked with longitudinal bands of yellow. Under side, white or pink. A prominent digging projection on the inner edge of the hind foot.

A mud puddle, or a temporary pool formed by a prolonged rain in early April sometimes swarms with toads that groan and squawk in a most unpleasant manner. Each squawk is like the groan made by a deep-voiced man having a tooth pulled. It may also be compared to the squawk made by a big rooster caught in the night. Such a sound coming from a temporary pool in April is almost surely the voice of a spadefoot toad.

A spadefoot toad makes its noise while it lies sprawled on the surface of the water. When it begins to sing, it suddenly distends its throat into a white pouch that is about double the diameter of its head. The result is that the pouch, floating on the water, lifts the toad's head up suddenly while the hinder parts of the body sink beneath the surface. At the expiration of the sound, the toad bobs back to its sprawling position. Each vocal effort lasts about a second. An active toad will repeat the sound about every ten seconds. A spadefoot singing in a pool

on a dark night may be recognized by its vocal *saw* which appears like a big white bubble shining in the light of the lantern.

Spadefoot toads are seldom quiet while they are in the water. They fight among themselves and tumble about in an active manner. They are shy and difficult to photograph. They appear in pools suddenly after a hard rain, and after a day or two they disappear into their underground retreats.

The only time when spadefoot toads are not shy is while they are actually laying their eggs. A pair of toads about to deposit a mass of eggs will cling to a stiff spear of grass about a foot beneath the surface of the water, and will slowly crawl up the stem, depositing a string of about two hundred eggs enclosed in a gelatinous envelope about as large around as the toad's leg. Each batch will be laid within five minutes, and during that time the pair may be approached readily. A toad will lay its eggs at intervals within a very few hours, and will then disappear from the pool.

The spadefoot is a burrowing toad, and spends the greater part of its time beneath the surface of the ground. It is about the size of a common toad, but its skin is much smoother. The sole of each hind foot bears a small horny projection, with which it digs the soil, and thereby sinks itself backward beneath the surface of the ground. This projection gives the toad its name, but it is inconspicuous, and is only a little larger than a similar projection that is found on the hind foot of the common toad. A sure mark of recognition is that the pupil of a spadefoot's eye is a vertical slit, like that of a cat, while in all other Long Island toads and frogs the pupil is a horizontal slit.

Spadefoot toads are considered to be rare, and few detailed observations of them have been made. Dozens of them suddenly appeared in a temporary pool near the Bay Avenue school building in Patchogue during the first week of April, 1912, after a series of hard rains. April seventh was warm and pleasant, and the toads were noisy all day. The temperature fell below freezing in the evening, and all the toads disappeared until the sixteenth, when the air again became warm, and a number reappeared for that day only. The temperature again fell in the evening, and no more spadefoots were heard until the twenty-seventh, when a few were heard after a hard rain. None were heard or seen after that date. A great number of eggs were laid, but no tadpoles survived the frosts.

The spadefoot toads suddenly reappeared on the evening of April 12, 1913 in several pools near Bay Avenue after a warm, hard rain. They were noisy on the thirteenth, but after that date the weather was cold and only a few were seen until the twenty-third. Then about fifty appeared in the pool which had just refilled on the site of the pool in which they were seen in 1912. After two or three days all the toads had disappeared. Hosts of tadpoles were hatched, but most of them were destroyed on account of their pools being filled in with soil. Those that survived completed their transformation into fully formed toads by the middle of June.

A few spadefoot toads appeared in a small permanent pool near the Bay Avenue school on April 27 and 28, 1914, and laid a considerable amount of spawn. There was a prolonged rain on May fourth and fifth and on the evening of the fifth great numbers of the toads appeared in the pool. About one hundred pairs were mated in the pool all through the following day, and their method of laying eggs was readily observed. The chorus of unmated males was loud on the evening of the sixth, but not one of the toads could be found on the seventh, although the temperature continued warm. On July 7, 1914, numbers of spadefoot toads appeared on the salt marshes adjoining the shore at Bay Avenue, Patchogue, after a week of rainy days. They sang in a loud chorus and many were mated. None could be found on the next day.

The tadpoles of spadefoot toads have been found in Oakdale and Speonk. The toads are widely distributed, and their times of appearance are as regular as those of other toads. They escape observation on account of their burrowing habits, and their short stay in the breeding pools. I made sure of finding them by hiring a small boy to visit the locality every evening.

1. CRICKET FROG

Hyla arborea (L.) (Baird)

Length of body 2 to 3 centimeters. ¾ to 1½ inches. Body slender. Upper jaw pointed in front. Ear small and indistinct. Legs long. Feet webbed. Color above dark red or green, usually with a distinct band of green down the middle of its back. Under parts white.

The cricket frog is the nimble fairy among the Long Island frogs. It belongs to the tree frog family, but the discs on the ends of its toes are too small to be of use in climbing. Its jumping ability, and its protective coloration compensate it for its lack of climbing power. Its slender body

in a tussock of grass looks like a withered leaf. Its favorite resting place is on a lily pad where its color is exactly matched. The color of the frog is either the dark olive of the upper surface of the lily leaf, or the rich brown of its under side. Many of the leaves have their under sides exposed at their edges, and so whether the frog be green or brown, it is almost invisible in its native marsh.

The voice of a cricket frog is a combination of a rattle and a musical clink, but it is only about half as loud as that of a spring peeper. A chorus heard at a distance sounds like the jingling of small sleigh bells, for the musical element of its call travels farther than the rattle. A chorus heard close by sounds like the rattle of small pebbles poured upon a cement pavement.

An individual frog sings for from thirty to forty five seconds at a time. Its call has three phases. The first phase lasts for about five seconds and sounds like the clicks of a boy's marble dropped upon a cement pavement once or twice a second from a height of about six inches. The second phase sounds like the galloping of a small pony on a brick pavement, or like the clicks of a boy's marble dropped upon a pavement from a height of only an inch or two, and allowed to bounce twice each time. The third phase sounds like the regular cree-cree-creeing of a tree cricket, or like the rattle of a boy's marble that bounces rapidly when it is dropped at frequent intervals from a height of only half an inch. The time and rhythm of the sounds are about the same as that of the following syllables pronounced with the speed of ordinary reading :—"click, click, click, click, - - - - - click-e-ty, click-e-ty, click-e-ty, click-e-ty, click-e-ty, - - - - - cree, cree, cree, cree - - - - -".

The cricket frog inflates a vocal sac under its chin during its call. It often sits quietly with its sac distended for many minutes between its calls. The violent efforts of its body in producing its sound make the frog resemble a small boy on his hands and knees blowing a fire with all his might. The vocal sac is bright yellow and when it is seen distended in the day time, it is so conspicuous that it reveals many a singer that otherwise would be almost invisible on a lily pad.

Cricket frogs are found in grassy marshes on the west end of Long Island as far east as Massapequa at least. They sing through all the month of May. On June 5, 1914, they were extremely abundant and noisy in several marshes in the vicinity of Jamaica. They are not suspicious and will retain the same position for minutes at a time. They may be observed and photographed even more readily than the spring peepers (*Hyla pickeri*).

4 COMMON TREE FROG

Hyla versicolor Le Conte

Length of body 3.8 to 5 centimeters (1.5 to 2 inches). Skin rough and slightly warty. Toes tipped with climbing discs. Color above, gray with black spots. A typical specimen has a black five-pointed star in the middle of its back. Some yellow in the folds of the limbs. Under parts very light gray.

The batrachian whose note is the most commonly heard, and the most widely known on Long Island, is the common tree frog or "tree toad." All through the summer its voice may frequently be heard calling for rain as farmers suppose. Its home is in the trees. The tips of its toes are equipped with pads which enable it to climb with great expertness. A tree frog that is disturbed will make a flying leap, and will readily cling to the first branch that it touches.

Tree frogs seek the water in May or June to lay their eggs. In 1913 the first one of the season was heard in Patchogue on May third, but the time of their appearance in the water is uncertain. Sometimes they appear suddenly in large numbers. In 1913 they appeared gradually, and disappeared in the same way.

The voice of the tree frog is a loud, musical trill, like a low-pitched whistle. It may be recognized by its extremely pronounced trill. Each individual call lasts about two seconds, and may be repeated at intervals of ten to twenty seconds.

When a tree frog sings, it distends a throat pouch to about the size of its head. The vocal pouch vibrates with the trilling, and so its photograph will often be blurred. The frog usually sings while sitting upright in a dry place, such as a lily pad or a branch over the water. It is not especially shy, and is usually easy to photograph.

Besides its trill, the tree frog has another note that is not generally known and recognized. This note is exactly like the sound made by a hen turkey that is calling to her mates. It is a low, mournful "chow, chow, chow, chow, chow," whistled with a descending pitch, repeated about three times a second for two or three seconds. When I first heard the sounds, their source was a mystery, for they were infrequent. But at last I discovered the musicians. Sitting on a small limb just above the water were two tree frogs about six inches apart. Turning about and facing each other, one gave its turkey call by chirping, while nodding its head and body with every chirp, like a puppy barking. It was at once answered by the other in the same way. The two then

quickly turned about and resumed their ordinary songs. This performance was repeated several times while I watched them with aching feet, for they waited a long time between their turkey calls. The Long Island negroes name the call a "turkey root," from a superstitious belief in the virtues of roots in conjuring and magic. A negro calls any mysterious sound or sight a conjure, or "root," and he will run a mile to avoid hearing a "turkey root."

A tree frog resting on the branch of an apple tree can scarcely be seen, for it looks like a bit of mossy bark. Zoologists call the tree frog *Hyla versicolor*, from the ability which it sometimes has to change the color of its skin to conform to the color of the object on which it rests, but this ability seems to be absent more often than it is present. The usual color of the tree frog is gray, with a black, five-pointed star between its shoulders.

5 SPRING PEEPER

Hyla puberula Holbrook

Length of body 1.8 to 3 centimeters .75 to 1.25 inches Skin, smooth and shining. Climbing discs on the toes. Color, pink to dark brown with dark cross lines on the back and legs. The back of a typical specimen has a dark vertical marking shaped like two Y's joined by their upright parts.

The first frog sound that is heard on Long Island in springtime is made by a small tree frog, scarcely an inch long, called the spring peeper. This little fellow has a smooth, shiny skin that is colored some shade of brown or red, varying from delicate pink to almost black. It sings while sitting in a bunch of grass, or on a floating leaf or stick, or clinging to a spear of grass. It looks like a tiny negro baby that has been in swimming. When it is about to sing, it distends its throat, and keeps the vocal sac expanded for minutes at a time, but it distends the sac still more at each peep. The spring peeper and the cricket frog are the only representatives of our frogs and toads that hold the vocal sac distended between calls.

The sound made by a spring peeper has the quality of a shrill whistle. Its pitch is very high, about C two octaves above middle C. It rises about half a tone during the peep. Each peep lasts about half a second, and is repeated for ten or twenty or more times at intervals of about a second. The sound may be imitated by whistling the notes at a pitch about as high as one can ordinarily whistle. Individual frogs occasionally whistle their notes with a distinct trilling.

No other frog on Long Island has a call that resembles the call of the spring peeper. Whistling, peeping sounds heard in a Long Island marsh in April are almost surely the sounds of spring peepers. In western New York, spring peepers are less abundant than on Long Island, and their places are largely taken by swamp cricket frogs, whose peeps somewhat resemble those of the Long Island spring peepers. The voices of the swamp cricket frogs may be recognized by their trillings, which are very distinct and coarse.

The voices of spring peepers may be expected about March fifteenth. In 1913, the chorus was loud on the sixteenth, although occasional sounds had been heard for three or four days previously. The chorus of their songs continues until about the middle of June.

Spring peepers are not young frogs of other species but are full-grown tree frogs. They have discs on the ends of their toes and are expert climbers. They leave the ponds at the end of the breeding season, and may afterward be found on orchard trees, or in damp grass throughout the warm months. They lay their eggs singly, attached to submerged sticks or blades of grass. These frogs are the least shy of all our frogs and toads. They may readily be approached with a bright lantern.

6. LEOPARD FROG

Rana pipiens Schreber

Length of body 7.6 to 11 centimeters; 3 to 4 inches. Body rather slender. Head somewhat pointed. Skin almost smooth. Hind feet partly webbed. Color above, dark brown or green approaching black, with longitudinal rows of darker spots; each spot bordered with a narrow fringe of white. Under parts entirely white.

The second batrachian voice that is usually heard in the spring is a croaking in an extremely low-pitched bass that is in great contrast with the shrillness of the voice of the spring peeper. The sound is made by the leopard frog. This frog is our only true croaker. Its note may be imitated by pronouncing the word *croak* very slowly, with the deepest possible bass voice, drawing out each elementary sound of the word as indicated by the spelling *k-e-r-r-o-a-k*. The sound has a distinct trill as if each letter were emphasized.

Each individual croak lasts for one or two seconds, but when a number of frogs sing in chorus, a frog will give forth its croaks in rapid succession, at intervals of a little more than half a second. If a number of frogs are in a small pool, they will frequently join in a chorus which lasts for two or three minutes, and which is followed by a pause during which scarcely a croak will be heard.

A leopard frog croaks while sitting still, half submerged in shallow water near the banks of a pool. While it is croaking it distends a large vocal sac over each shoulder. One about to croak slowly distends its body, and then suddenly inflates its vocal sacs as it begins its sound. The sacs continue to swell while the sound is emitted, and instantly collapse at its close. When the frog sings with a chorus of others, it emits a series of four or five quick croaks while its sacs continue to distend until they reach their full capacity. The sacs then suddenly collapse while the air is drawn back into the body, but they may be again distended, and the song resumed so quickly that there is scarcely a break in the sounds.

The chorus of leopard frogs usually begins about the last week in March, and continues with diminishing volume until the last week in May. The frogs are much more shy than the spring peepers, but still they may be approached readily with a lantern.

The leopard frog is the common spotted frog of marshes, especially of salt marshes. It is very common on the salt marshes of the Great South Beach. In the summer it is found on land much more frequently than in the water. The body of a full-grown specimen is three or four inches long.

The back of a leopard frog is dark brown or olive or almost black in color, and its under parts are pure white. It may be known by the dark spots on its back and legs. Each spot is surrounded by a narrow whitish rim. The only other Long Island frog that has spots on its back is the pickerel frog, but the hinder parts of this species are yellow underneath, while the leopard frog is pure white on all its under parts.

7. PICKEREL FROG

Rana palustris Le Conte

Length of body 7.5 to 7 centimeters, 3 to 3.5 inches. Body rather slender. Feet webbed. Color above, dark yellow or brown with darker spots not bordered with white. Under parts white in front, yellow behind.

A spotted frog that is seen in pools and streams away from salt meadows and low plains is more likely to be the pickerel frog than the leopard frog. Pickerel frogs are not nearly so common on Long Island as leopard frogs, but still they are plentiful, especially along the edges of mill ponds. They prefer to lie under overhanging grasses and weeds, and are not easily induced to come into the open water.

The voice of a pickerel frog is low in pitch, and small in volume. One will not be heard at a distance of many rods, unless the night is extremely still. Few persons would notice the sound at all, unless their attention were called to it. The sound resembles a gentle, musical snore by a sleeping person. It is unmistakable if its snoring quality is remembered. Its song lasts about half a second, and it sings at intervals of about five minutes.

The pickerel frog usually sings while it is concealed under the grass, or hidden in the leaves at the edge of the water. Its color is yellowish, and blends with that of dead grass and leaves. An observer might search for hours and not discover the source of a sound that is at his feet. When one is found singing in the open part of a pond, the chances are that it will dive beneath the surface before a camera can be set up beside it.

The pickerel frog begins to swell out its throat as soon as it begins its song, and by the time the song is completed, the sides of its neck also are considerably swollen. But it does not inflate its throat and neck to nearly so great a degree as most other frogs and toads.

The yellow of the underside of a pickerel frog is a mark by which it may be distinguished from the leopard frog. A further mark that may help to distinguish it from the leopard frog is the absence of a light-colored rim around each of the dark spots of its back.

The pickerel frog is an aristocrat among frogs, as is evident from the softness of its voice, its aloofness from its more common neighbors, the sleekness of its beautifully marked body, and the grace and ease with which it jumps and swims.

8. WOOD FROG

Rana sylvatica Le Conte

Length of body 3 to 7 centimeters 1 to 3 inches. Body and head slender; legs extremely long. Skin smooth. Feet webbed. Color above, reddish or brownish, varying from light to almost black. A white line extends along the upper jaw back to the shoulders. A dark patch behind each eye.

After a couple of unusually warm days in early spring, the woodland pools will suddenly give forth a chorus of explosive clucks. These are the sounds made by the wood frog. The voice of a wood frog is like the sound made by a teamster clucking to his horses. One may imitate it by placing the under side of the tip of the tongue against the

roof of the mouth and making an explosive clucking sound which has no hissing quality. When wood frogs are heard at a distance, they sound like a flock of barnyard ducks clucking, not quacking. The sounds might be mistaken for a chorus of leopard frogs, unless attention is given to the individual notes. A leopard frog drawls out each individual sound, while each note of a wood frog is an explosion.

Wood frogs usually appear in their pools suddenly, and in great numbers. They are extremely shy, and cannot be approached readily. They lie sprawled on the surface of the pools, away from the banks, and are usually in constant motion. The males fight among themselves, and turn somersaults as they wrestle, but they are unable to harm one another. They are land frogs, but seem possessed with the desire to make the most of the water during their short breeding season.

A wood frog usually makes its sound while lying on the surface of deep water. It distends the sides of its throat and the regions over its shoulders, but it does not possess well-defined sacs, like the leopard frog. When it makes its noise, it swells out its throat with such an explosive vigor that it produces circles of waves in the water around its head. The sound is made without warning and with such suddenness that a camera can catch only the waves produced by the vocal effort. A photograph of a wood frog with its neck and throat distended in song could be obtained only by the merest chance. A wood frog frequently makes three or four clucks in rapid succession, but while it is making a series of clucks, it is nearly always swimming so fast that a camera cannot be kept focused on it.

In the year 1913 wood frogs appeared in a pool in the woods near Patchogue on March sixteenth. The day was extremely warm, and had been preceded by three or four days of mild weather. The frogs remained for about a week, but they sang in the daytime only, for all the evenings were cool. On the seventeenth the temperature did not rise above 55° F., and no frogs were heard. On the nineteenth and twentieth the temperature rose to 55° F., at noon, and the frogs sang in a chorus. The temperature fell on the twenty-first, and few wood frogs were heard after that date. In the meantime, they had laid an abundance of eggs.

A wood frog lays its eggs in a globular mass about two inches in diameter, so closely attached to a small stick or stiff spear of grass that the whole mass may be lifted from the water. The only other Long Island animals that lay eggs in a similar manner are two of the larger salamanders.

The wood frog is our most active frog, and the one that is the most difficult to catch. Any frog that is seen in a wood or field, and that makes extremely long leaps, is probably a wood frog.

9. GREEN FROG

Rana clamitans Latreille

Length of body 7.65 to 12.75 centimeters (3 to 5 inches). Body rather long and slender. Skin usually somewhat rough. Hind feet webbed, the web extending to the second from the last joint of the longest toe. A conspicuous fold on each side of the back. Color above, greenish brown to bright green. White below.

The green frog is the common frog that is seen in Long Island pools and streams throughout the summer. Its note resembles that made by plucking a string on a harp or a bass violin. No other frog or toad produces a sound that resembles it. The green frog sings all through the months of May and June. In 1913 the first one was heard in Patchogue on May first.

The green frog makes its sound while crouching half submerged in shallow water at the edge of a pool. It will hold its position for many minutes, and will readily allow itself to be photographed. It frequently gives out a series of three or four notes at intervals of about a second, but it is not a persistent singer. An observer is fortunate if he hears one sing once in five minutes.

When a green frog sings, it swells out its throat and the sides of its neck until it looks as if it had the mumps. But the song is completed so quickly that the photographer must snap the camera instantly, at the very beginning of the sound, in order to secure a picture of the frog in the act of singing.

The green frog is the largest of the Long Island frogs except the bull frog. Specimens with a body length of over four inches may frequently be seen.

10. BULL FROG

Rana catesbeiana Shaw

Length of body 15.25 to 26.35 centimeters (6 to 8 inches). No prominent ridges on the back. Hind feet webbed, the web extending to the last joint of the longest toe. Color above, green or greenish brown, below white.

Long Islanders call every big green frog a bull frog. The chances are, however, that very few of the present generation have seen a bull frog on the Island. These frogs were common about fifty years ago, but

the only place where I have found them is at Wading River. There they are abundant in two ponds.

The bull frog looks like a big edition of the green frog. Its size is startlingly large, and specimens frequently measure over eight inches in the length of their bodies. Any Long Island frog that measures a foot from the tip of its nose to the ends of its toes must be a bull frog.

The volume of a bull frog's voice corresponds to the size of its body. Its sound resembles the bellowing of a bull. The frog bellows about once a second for four or five seconds, then is silent for about five minutes, when it begins again, and continues the performance all through the night.

While a bull frog bellows, it swells out its throat and the sides of its head as a green frog does. It sings while it is sitting quietly, half submerged in shallow water. It often keeps the same position for half an hour. One may readily approach and photograph it. The bull frogs are the last of our Long Island frogs to start croaking in the spring. Their chorus is usually at its height during the last week in June.



GREEN FROG. *Rana clamorans*.
 From a photo. made at Islip, Long Island, May 2, 1914.

FIG. 1

EXPLANATION OF PLATES.

Fig. 1. p. 30. *Scaphiopus holbrooki*. Pair in the act of spawning. Drawn from life by Richard A. Deckert.

PLATE 2. *Bufo toadleri*.

Fig. 2. Male singing.
Fig. 3. Common toad is paired.

PLATE 3. *Bufo toadleri*.

Figs. 4, 5, 6. Eggstrings, tadpoles, and young imago of the common toad.
Figs. 7-11. Five photographs of male toads.

PLATE 4.

Fig. 12. A favorite breeding pool of *Bufo fowleri*, Patchogue, L. I.
Fig. 13. A male of *Bufo americanus*, the common toad of the New York mainland. Photographed at Ithaca, N. Y.

PLATE 5. *Scaphiopus holbrooki*.

Fig. 14. Portrait of a spadefoot toad.
Fig. 15. A mated pair.

PLATE 6. *Scaphiopus holbrooki*.

Fig. 16. Pool at Patchogue, L. I., where spadefoots were first observed.
Fig. 17. A spadefoot.
Fig. 18. Eggstring of spadefoot toad, photographed under water.
Fig. 19. A spadefoot calling in response to the stimulus of being tickled.
Figs. 20-22. Male spadefoots "squawking" in the water.

PLATE 7.

Figs. 23, 25. *Hyla cinerea*, three songsters.
Figs. 26, 27. *Hyla cinerea*, two frogs trilling.
Fig. 28. A spring peeper, *H. springeri*, and, fig. 29, the same individual with throat and body distended in song.
Figs. 30-32. *Hyla pubescens*.

PLATE 8.

Fig. 33. Pickerel frog (*Rana palustris*), "snoring."
Fig. 34. Leopard frog (*Rana pipiens*), with paired vocal sacs distended in song.

PLATE 9. *Rana pipiens*.

Fig. 35. Leopard frog with sacs inflated, and (fig. 36) the same individual with sacs collapsed and body distended at the expiration of the song.
Figs. 37, 38. Leopard frogs, at rest and singing.

PLATE 10. *Rana clamitans*.

Fig. 39. Wood frog.
Fig. 40. Breeding place of wood frogs, Patchogue, L. I.
Figs. 41, 42. Wood frogs swimming. Note, in fig. 42, the ripples caused by the explosive "clucking" call of the frog.

PLATE 11.

Fig. 43. Egg mass of wood frog (*Rana clamitans*).
Fig. 44. Green frog (*Rana clamitans*) singing with swollen "cheeks."
Fig. 45. Portrait of a green frog (*Rana clamitans*).

PLATE 12.

Fig. 46. Green frog (*Rana clamitans*), singing.
Fig. 47. Bull frog (*Rana catesbeiana*) calling.

PLATE 13. *Rana catesbeiana*.

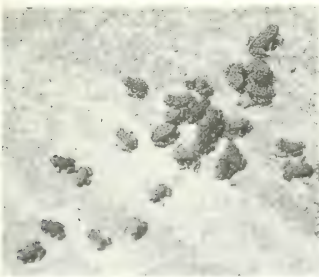
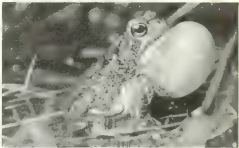
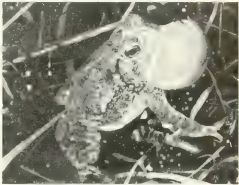
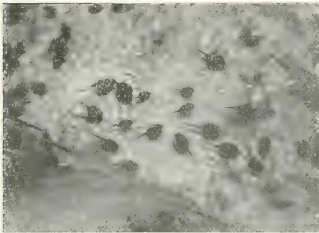
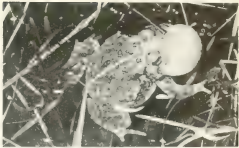
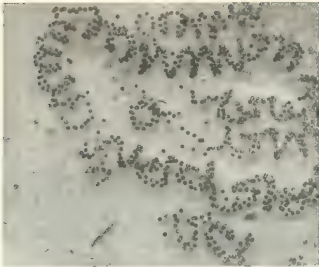
Fig. 48. Head of bull frog, about life size.
Fig. 49. Bull frog in the act of bellowing.



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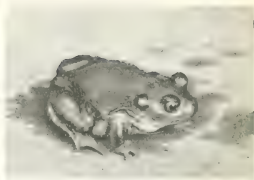
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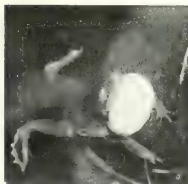
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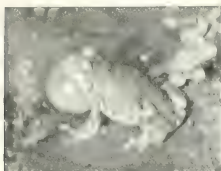
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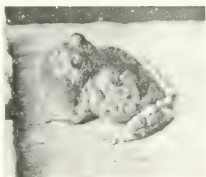
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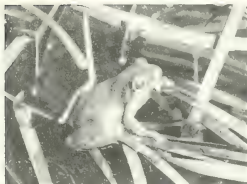
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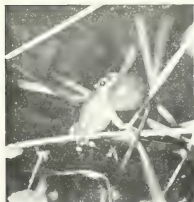
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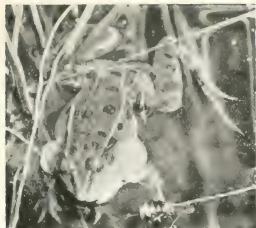
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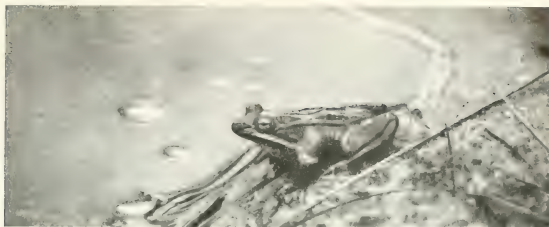
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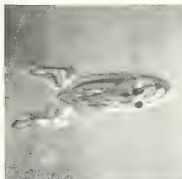
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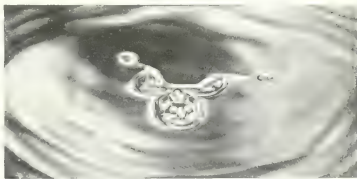
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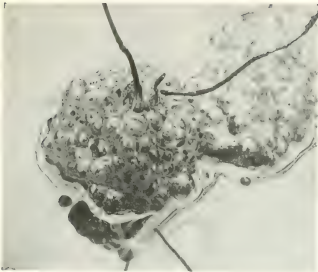
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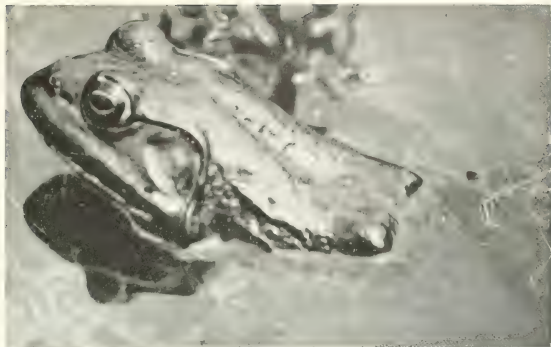
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OVERTON LONG ISLAND SALIENTIA

THE MUSEUM
OF
THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

41

SCIENCE BULLETIN

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A REPORT ON THE SOUTH GEORGIA EXPEDITION.

EDITED BY ROBERT CUSHMAN MURPHY.

Plates 14—18.

Introduction	43
Plants Collected on the South Georgia Expedition. By <i>Norman Taylor</i>	60
<i>Anasterias Octoradiata</i> , Nouvelle Asterie de la Georgie du Sud. By <i>R. Koehler</i>	64
Mollusca from South Georgia. By <i>Wm. H. Dall</i>	69
The Male of <i>Pandarus Satyrus</i> . By <i>Charles B. Wilson</i>	71
Amphipods of the South Georgia Expedition. By <i>Clarence R.</i> <i>Shoemaker</i>	73
Arachnida from South Georgia. By <i>Nathan Banks</i>	78
Mallophaga from Birds of the South Atlantic. By <i>Vernon L.</i> <i>Kellogg</i>	80
Collembola, Siphonaptera, Diptera and Coleoptera of the South Georgia Expedition. By <i>Charles Schaeffer</i>	90
Anatomical Notes on the Young of <i>Phalacrocorax Atriceps</i> <i>Georgianus</i> . By <i>R. W. Shufeldt, M.D.</i>	95

INTRODUCTION.¹

The expedition to South Georgia was carried out through an agreement between the American Museum of Natural History and the owners of the brig "Daisy" of New Bedford, Massachusetts, whereby a representative of the American Museum and of the Museum of the Brooklyn Institute of Arts and Sciences was to reside on board the "Daisy" during a cruise for whale and sea-elephant oil in the South Atlantic Ocean. I was appointed for this work in January, 1912. The chief objects of the trip were to make a collection of birds at South Georgia, and to secure skeletons and skins of the southern sea-elephant (*Mirounga leonina*). The latter object was frustrated by the failure of the Captain to render the amount of assistance stipulated in the contract, but a good



THE BRIG DAISY OF NEW BEDFORD.

For the illustrations used in the Introduction I am indebted to the editors of *Harper's Magazine*, the *American Museum Journal*, and the *Brooklyn Museum Quarterly*. For

series of sea-elephant skulls was obtained. No particular preparation was made for gathering invertebrate animals; as the single scientific worker on the expedition I had planned to devote my field labors to mammals, birds, and fishes. Nevertheless a small aggregation of invertebrates, as well as geological specimens and plants, were collected, and some of these are reported upon by specialists in the following pages.

The entire trip occupied a year, but since it was made in a sailing vessel, without auxiliary steam power, much of the



VIEW FROM THE SHORE OF MORaine FJORD, CUMBERLAND BAY

time was spent in enforced idleness so far as zoological collecting is concerned.

I left New York on May 25, 1912, and joined the "Daisy" at Barbados, B. W. I., although the start of the actual voyage from the West Indies was delayed until July 31. During the whole month of July, however, we cruised in the vicinity of Guadeloupe, Dominica, and Martinique, where a series of skulls of the blackfish, (*Globiocephalus* sp.) was secured, together with full flesh measurements of these mammals. Leaving Roseau, Dominica, on the last day of July we sailed

northward to the latitude of Bermuda and thence eastward across the Atlantic. This period was characteristic of the greater part of the voyage in that much time was consumed with very little opportunity for accomplishing anything of material value. I collected fishes on all possible occasions but there were necessarily days and weeks of idleness. The



THE "DAISY" IN KING EDWARD COVE, CUMBERLAND BAY
SUGAR TOP IN THE BACKGROUND

one important practical result of the summer at sea is a series of photographs illustrating the methods of old-fashioned sperm whaling, a subject which I found abundant opportunity to study both from the masthead and from the whale boats. In all about twenty-six sperm whales were taken by the crew. It was not practicable to save even one whale skull because of



NORDENSKJOLD GLACIER

lack of room, but the Captain cleaned up an unusually large lower jaw for the museums.

On September 18, 1912, we anchored in Porto Grande, San Vincente, Cape Verde Islands, and for two days I had a chance to collect ashore, taking principally insects and vertebrates, including one reptile and several birds peculiar to that group of islands. Resuming the voyage toward the south, we continued sperm whaling, and also captured two porpoises, one (*Prodelphinus traenatus*) a well known species, the other apparently new to science. These were photographed, measured and skeletonized, and, together with the blackfish mentioned above and one beach-worn killer (*Orca*) skull, they constitute all the cetacean material taken on the expedition. Our failure to capture more porpoises was a great disappointment to me. Not a single specimen was successfully harpooned from the martingale during the trip, although attempts were made occasionally.

On October 16, 1912, the "Daisy" visited the Brazilian island of Fernando Noronha where I spent a pleasant and successful day ashore, obtaining examples of tropic birds



CUMBERLAND BAY.

(*Phaethon*), boobies, noddies, the white tern (*Gygis*), specimens of endemic land birds and of a unique lizard, and other material. Fernando Noronha was the last land sighted on the outward voyage.

In the South Atlantic animal life was far more abundant than we had found it within the Tropics. Birds, mostly of the order Tubinares, were exceedingly numerous and the only drawback to successful collecting was the prevailing rough sea. However, on a very few occasions during quiet weather, I was able to lower my dory and shoot good bags of birds, in addition to which a few were caught from time to time on fish lines from the stern of the brig.

South Georgia was not sighted until November 23, 1912, so that more than half of the year had passed before I could begin on the real business of the expedition. We came to anchor on November 24, and for a while lay in Cumberland Bay, the principal harbor of the island. This region did not offer good sealing grounds owing to the refuse from the whale factories and to the continual passing of steamers engaged in the modern whaling industry of that port. On December 13,

therefore, the "Daisy" weighed anchor and sailed to the Bay of Isles near the western termination of South Georgia, an isolated region where our Captain had hunted sea-elephants during other years; and here we remained at one anchorage until the latter part of February. Wild life was abundant at this part of the coast, and as soon as I had pitched a tent ashore the collection and preparation of specimens occupied all available time during the long hours of daylight. The difficulties of working were great indeed, chiefly because the camp outfit proved wholly inadequate for the conditions encountered. South Georgia is a region of almost continuous violent gales, and a tent was practically worthless. It was impossible to keep an oil stove burning within it, so that I suffered considerably from the cold while preparing specimens, and moreover the tent blew down frequently, exposing everything to the snow and sleet. Eventually it blew to shreds, and most of the bird skins and skeletons had to be dried in the over-crowded cabin of the "Daisy." There was, of course, absolutely no sheltered place where I could work on board the vessel, and whatever I did there had to be done on deck. Very often the blizzards made it impossible for a boat to leave the ship; and sometimes we were storm-bound for three successive days so that collecting progressed but slowly. In order to obtain skulls, etc., of seals, it was usually necessary for me to accompany the whale boats on long trips, thus losing a whole day each time and gaining little, for the boats were always loaded to the gunwales with blubber and could carry no heavy specimens back to the ship. Much valuable work in securing skeletons and skins might have been accomplished on several occasions but for the fact that I had to labor alone, and in the case of these large and heavy mammals one man is helpless at such an undertaking.

From the end of February until March 15, 1913, the "Daisy" lay in Possession Bay where my work continued without much variation. After starting on the homeward voyage we had a good deal of stormy weather and I was able to lower for sea birds only twice. On April 8 we visited the islet of South Trinidad, and although we could not effect a landing because of the surf, I secured a collection of birds and fishes several of which have proved to be new to science. Once

we were within the Tropics the only delay was occasioned by a successful whale hunt or two, and a week's calm on the Equator. On May 8 we arrived at Barbados, from where I took the first steamer home, arriving in New York May 24, 1913, after an absence of exactly one year.

The collections of the expedition are the property of the American Museum of Natural History and the Brooklyn Museum. The principal items are as follows: upwards of four hundred photographic negatives of birds and marine mammals, whaling, South Georgia physiography, etc.; series of skulls of the seals *Mirounga* and *Ogmorhinus* and one skin and



LOOKING EASTWARD OVER THE BAY OF ISLES.

skeleton of the latter; skulls, skeletons or embryos of six species of cetaceans; five hundred birds representing about 55 species, and including many skeletons as well as skins; more than a hundred sets of birds eggs; 78 fishes in alcohol, a few reptiles, miscellaneous collections of insects and marine invertebrates, histologic preparations, etc., etc.

It is greatly to be regretted that all of the fishes obtained at South Georgia disintegrated on the homeward voyage owing probably to the separation and stratification of the mixture of water and alcohol in which they had been placed.

The collections are now being worked up, but of course it may be several years before reports on the mammals and

birds can be completed. The bibliography of the expedition up to date includes the appended list in which several of the references are to purely popular articles.

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13. Notes on Pelagic Fishes. 'Copeia,' N. Y., No. 6, May, 1914.
14. Die "Bay of Isles" in Sudgeorgien. *Petermanns Mitteilungen*, Vol. 60, I, 1914, pp. 279-280, with a reconnaissance map, p. 280.
15. Reactions of the Spider, *Pholcus phalangioides*. *Journ. N. Y. Entomol. Soc.*, XXII, pp. 173-174.
16. Cruising in the South Atlantic. *The Brooklyn Museum Quarterly*, Vol. I, No. 2, July 1914, pp. 83-110, 23 photographs.
17. Observations on Birds of the South Atlantic. 'The Auk,' Vol. XXXI, 1914, pp. 439-457, pl. XXXV-XXXIX, (29 figs.).
18. Nichols, John T., and Murphy, R. C. A Review of the Genus *Phaebetria*. 'The Auk,' Vol. XXXI, 1914, pp. 526-534, pl. XLI.

The following record comprises certain invertebrates which are not listed in the special papers of this bulletin. Footnotes refer to the authorities responsible for the identifications; the figures preceding each species refer to serial numbers in the writer's field catalogue.

Nematodes.¹

- No. 1117. *Stenurus minor* (Raspail, 1830). Numerous specimens taken from the ear passages of the cetacean *Globiocephalus brachypterus*. West Indies (Dominica), July, 1912.
- No. 1302. *Ascaris simplex* Rudolphi, 1800. One specimen from the blubber of the sperm whale (*Physeter macrocephalus*). South Atlantic Ocean.
- No. 1022. *Ascaris osculata* Rudolphi, 1802. Numerous specimens from stomachs of sea-elephants (*Mirounga leonina*). South Georgia.

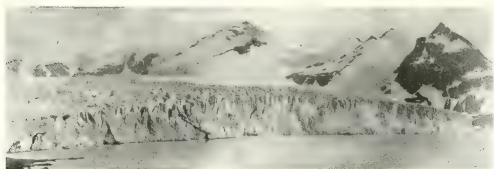
Trematodes.¹

- No. 1182. *Distomum ampullaceum* Büttel-Reepen, 1900. Two specimens from the intestine of *Sphyræna picuda*, lat. 32° N., long. 51° W., Aug. 22, 1912.
- No. 1185. *Hirundinella clavata* (Menzies, 1791) Blainville, 1828. One specimen from the intestine of a dolphin (*Coryphæna hippurus*), lat. 32° N., long. 46° 12' W., Aug. 26, 1912.

Leeches.

- No. 1815. *Abranchus brunneus*² Johansson (?). Young specimens taken while feeding on meat at a depth of 2 meters. Bay of Isles, South Georgia, Feb. 8, 1913.

¹ Bureau of Animal Industry, U. S. Dep't of Agriculture.
² J. Percy Moore, Philadelphia, Pa.



GRACE GLACIER, BAY OF ISLES

- No. 1072. *Piscicola* sp. One specimen from the mouth of a shark (*Ginglymostoma cirratum*). Trinidad Islet, South Atlantic Ocean, April 8, 1913.

Oligochaets.

- No. 1911. *Microscolex georgianus*³ (Michaelson). Several specimens taken at the surface of the ground. Possession Bay, South Georgia, Mar. 11, 1913.

Asteroids.

- No. 1714. *Porania antarctica*.⁴ Two specimens dredged from a depth of 10 meters. Bay of Isles, South Georgia, Jan., 1913.

Crustaceans.

- Mysidacea.⁵ No. 1735. *Antarctomysis maxima*. Several specimens from stomachs of penguins (*Pygoscelis papua*). Bay of Isles, South Georgia, Jan., 1913.

- Isopoda.⁶ No. 1366. *Idothea metallica*. Two specimens from mouth of a dolphin (*Coryphæna hippurus*). lat. 20° 18' S., long. 41° W., Nov. 1, 1912.

³ Frank Smith, Urbana, Ill.

⁴ Austin H. Clark, Washington, D. C.

⁵ W. M. Tattersall, Washington, D. C.

⁶ H. Richardson Searle, Washington, D. C.

No. 1915. *Cassidinopsis emarginata*. One specimen. Possession Bay, South Georgia, Mar. 8, 1913.

No. 1916. *Serolis septemcarinata*. Thirteen specimens. Possession Bay, South Georgia, Mar. 8, 1913.

Cape Woodrow
Wilson.



Point
Bellingshausen.



THE BOAT LANDING COVE, AND THE EASTERN PORTION OF THE BAY OF ISLES

SOUTH GEORGIA.

The principal older accounts of South Georgia are those of Cook, 1777; George Forster, 1777; J. R. Forster, 1778; Weddell, 1825; Fanning, 1833; Bellingshausen, 1834 (available through a German transcript, Leipzig, 1902); and Kluttschak, 1881. Modern scientific investigation began with the German expedition of 1882-1883, the main report of which

was issued in 1890.¹ Since that date South Georgia has been visited by two important Antarctic expeditions, namely the Swedish expedition of 1902-1904, and the German (Filchner) expedition of 1912, through both of which our knowledge of the island has been greatly extended. Among recent authorities who have worked either independently or as



OBSERVATORY OF THE OFICINA METEOROLÓGICA ARGENTINA, KING EDWARD COVE, CUMBERLAND BAY. MT. PAGET 8,383 FT., THE SUMMIT OF THE ALARDVCE RANGE, IN THE BACKGROUND.

members of the staffs of expeditions, are the following: Nordenskjöld, 1905, Heim, 1912, Ferguson, Tyrrell, Gregory, 1914 (mineralogy, geology); Mossman, 1909-1914 (meteorology); Skottsberg, 1902-1912, Cardot, 1908 (botany); Verrill, 1895, Lönnberg, 1906, Szielasko, 1907, Wahlgren, Mjöberg, 1906, Enderlein, 1909-1912, Sars, 1909, Michaelsen, 1900-1907

¹ Die Internationale Polarforschung, Die Deutschen Expeditionen und Ihre Ergebnisse, Berlin, 1890.

(zoology); Duse, 1904, Szielasko, 1907, Wilson, 1912 (cartography, etc.).

Writing in 1912¹ on the climate of South Georgia and its influence upon the vegetation, Dr. Carl Skottsberg regrets that few meteorological data are available with the exception of the widely quoted table based upon the German observations at Royal Bay during the season of 1882-1883. To overcome this lack of information I offer the following figures obtained at the small observatory on the shore of Cumberland Bay.² The abstract was kindly supplied by Mr. George O. Wiggin, Sub-Director of the Oficina Meteorológica Argentina, under the auspices of which the records have been made since August, 1909.

DATA FROM CUMBERLAND BAY, SOUTH GEORGIA, 1907-1912

The figures in each case represent the monthly mean. Temperatures are in Centigrade degrees; atmospheric pressures and precipitation in millimeters; cloudiness and wind force are registered according to the scale 0 to 10.

1907							
	Barometer	Temperature	Relative humidity Per cent	Vapor pressure	Cloudiness	Estimated force of wind	Total rain fall in mm
Aug.	751.66	4.63	78.1	2.65	5.7	1.5	47.5
Sept.	49.74	-1.32	77.3	3.26	6.8	1.9	111.5
Oct.	52.79	1.01	75.0	3.75	7.4	1.5	43.7
Nov.	41.97	3.27	71.9	4.13	7.4	1.9	66.5
Dec.	43.80	3.28	75.6	4.36	7.6	1.8	157.7
1908							
Jan.	744.84	5.24	74.6	4.96	7.5	1.6	53.4
Feb.	46.41	6.66	77.7	5.74	6.3	1.8	113.8
Mar.	50.66	7.18	75.4	5.75	5.9	2.3	71.7
Apr.	48.30	3.79	78.8	4.73	6.7	1.4	98.3
May.	47.45	1.07	75.0	3.80	6.6	1.7	118.4
June.	50.23	-2.53	85.7	3.32	5.9	0.5	65.6
July.	41.34	-2.43	79.3	3.11	6.4	1.7	252.5
Aug.	52.99	0.41	73.4	3.52	6.1	2.3	139.5
Sept.	53.04	2.70	76.3	4.18	6.2	1.7	107.4
Oct.	48.50	1.95	76.6	4.10	6.8	1.8	200.8
Nov.	43.81	4.37	72.6	4.49	7.6	2.0	127.9
Dec.	44.85	3.45	74.9	3.86	7.8	1.2	68.9

¹ Wiss. Ergeb. Schwed. Sudpol. Exp., Band IV, Lieferung 12, 1912, p. 4.

² Abstracts of meteorological observations made at South Georgia have been published by R. C. Mossman as follows: Trans. Roy. Soc. Edinburgh, Vol. 47, 1909, pp. 104-116, 2 pl.; Scott. Geogr. Mag. XXV, 1909, pp. 308-313, *ibid.* XXVI, 1910, pp. 407-417, Quart. Journ. Roy. Meteor. Soc., Vol. 40, 1914, pp. 347-353.

— 1909 —

	Barometer	Temperature	Relative humidity Per cent	Vapor pressure	Cloud-ness	Estimated force of wind	Total rain- fall in mm.
Jan	743.34	6.57	72.9	5.30	7.2	1.8	51.5
Feb.	45.41	4.86	76.8	4.99	7.1	1.9	90.2
Mar.	47.83	5.05	75.4	4.95	7.3	1.6	226.8
Apr.	41.59	2.74	74.6	4.17	7.2	2.1	210.3
May.	44.16	1.04	75.9	7.59	6.4	2.0	147.3
June	50.24	-1.32	78.6	3.30	6.6	1.4	87.6
July	49.02	1.47	74.1	3.16	6.7	1.8	97.5
Aug.	47.25	0.46	80.3	3.81	6.5	2.0	136.2
Sept.	50.81	0.12	80.6	3.76	6.4	2.4	99.6
Oct.	51.13	2.40	83.5	4.54	6.6	2.0	93.6
Nov.	44.65	3.61	80.6	4.83	6.9	2.6	166.4
Dec.	44.74	4.51	83.8	6.29	7.6	2.4	184.6

— 1910 —

Jan.	742.60	6.42	79.2	5.64	7.4	2.6	57.5
Feb.	50.19	6.02	82.4	5.80	6.6	2.1	30.5
Mar.	49.51	5.16	86.6	5.77	6.9	1.8	102.4
Apr.	45.23	2.83	86.6	4.92	7.3	2.1	187.0
May.	46.58	0.57	82.1	4.00	6.0	2.0	185.4
June.	43.39	6.72	83.1	3.66	7.3	1.9	123.7
July	49.09	0.84	85.0	3.72	6.2	1.9	130.6
Aug.	46.70	1.12	81.0	3.46	7.1	2.7	175.8
Sept.	49.30	0.57	81.3	3.94	6.4	2.4	164.7
Oct.	—	—	—	—	—	—	—
Nov.	45.18	—	81.3	5.03	7.7	2.9	75.1
Dec.	—	—	—	—	—	—	—

1911

Jan.	—	—	—	—	—	—	—
Feb.	—	—	—	—	—	—	—
Mar.	—	—	—	—	—	—	—
Apr.	—	—	—	—	—	—	—
May.	—	—	—	—	—	—	—
June.	749.53	2.02	80.0	3.16	5.6	1.8	140.8
July.	46.14	2.12	75.4	2.99	6.1	1.8	107.3
Aug.	45.09	-1.19	79.2	3.32	6.2	1.5	216.9
Sept.	53.03	0.37	71.9	3.39	5.5	2.0	35.9
Oct.	47.73	2.79	62.1	3.41	6.2	2.9	61.4
Nov.	41.44	1.31	82.7	3.64	7.5	1.9	105.0
Dec.	50.36	2.56	66.8	3.66	7.8	1.6	47.5

— 1912 —

Jan.	749.64	5.71	73.7	4.98	7.8	1.5	64.3
Feb.	44.62	5.71	72.8	4.97	7.9	1.8	203.1
Mar.	40.49	3.70	68.4	4.12	7.5	2.3	147.4
Apr.	41.87	1.5	72.7	3.70	6.4	2.0	112.1
May.	42.82	1.30	75.0	3.78	7.0	3.0	165.5
June.	48.60	-1.30	80.0	3.41	6.0	2.0	34.5
July.	45.41	3.50	76.0	2.75	6.3	6.8	70.4
Aug.	47.84	-2.5	72.0	2.89	7.0	2.0	97.1
Sept.	47.53	1.00	68.0	3.33	5.0	2.0	67.1
Oct.	49.17	1.60	66.0	3.43	7.0	2.0	65.6
Nov.	40.20	3.10	64.4	3.67	8.0	1.9	158.1
Dec.	44.42	3.60	72.0	4.26	8.0	2.6	144.4

The daily observations were made at 8 A. M., and at 2 and 8 P. M. The figures have not been corrected to a 24-hours' mean. The Argentine Observatory, as may be seen from the photograph on p. 54, is unfavorably situated for obtaining just records of direction and velocity of wind. It is, indeed, quite sheltered from the influence of the prevailing south-westerly winds.

The atmospheric pressure at South Georgia is low, though not so low as that observed farther south, the annual mean of barometric height being about 745 mm. Great changes sometimes occur within short intervals; on April 19, 1883, a range in the readings of 42.1 mm. was observed during the course of twenty-four hours. In the northern hemisphere Iceland alone might show the like. The season of lightest pressure occurs during September and October (spring), with a falling off in November to an average of about 743 mm., approaching or equalling the monthly minimum for the year. According to the observations of the German Expedition (1882-1883) the lowest readings are never attended by violent storms.

The mean temperature for the year ending September, 1883, was $+1.7^{\circ}$ C.; the average for the years 1908, 1909, and 1912 is $+1.36^{\circ}$ C. February (late summer) is the warmest month, with an average temperature for five years of $+5.7^{\circ}$ C. June marks the opposite extreme, with an average for five years of -2.01° C., although an average of six years for July gives approximately the same figure, -2.00° C. The remarkably high temperature given in the table for June, 1910, namely $+6.72^{\circ}$ C., does not wholly inspire confidence, and I have disregarded it; however, the exceptionally low atmospheric pressure recorded during that month, as well as the excess of cloudiness over the average, indicate that the temperature may be stated quite correctly. The temperature of the surface sea water showed an annual mean of $+1.63^{\circ}$ C. in 1882-1883. The limitations imposed upon the region by a purely oceanic climate are illustrated by the recorded absolute maxima and minima of air temperature, $+20.7^{\circ}$ C. (February), -12.3° C. (July).

The mean annual amount of cloud is in the neighborhood of 7, the maximum being in summer (Dec. Jan.), the minimum in late winter and early spring (Aug., Sept.). Most of the clear days occur in winter. The days with precipitation were 200 during 1908, but 304 during the year ending in September, 1883. The average total precipitation per year, based on the records of three years, is 1444 mm., considerably higher than the German estimate of 988 mm. for 1882-1883. 75.5 mm. of rainfall has been observed in one day—Aug. 7, 1883.

Precipitation at South Georgia is at its minimum for the year in June, the period, according to Mossman, of maximum precipitation at the neighboring continental region of Staten Island, east of Tierra del Fuego.

Below is a representative abstract of the temperature and precipitation according to seasons, based on the records of the German station at Royal Bay during 1882-1883.

	Mean temp.	Means of maxima.	Means of minima.	Absolute maximum.	Absolute minimum.	Days with frost	Days with precipitation.	Days with snow	Amount of precipitation.
Spring (Sept.-Nov.)	1.1	3.8	1.5	9.8	-6.9	58	65	49	315.5
Summer (Dec.-Feb.)	4.6	7.4	1.9	17.8	-0.2	3	81	47	241.7
Autumn (Mar.-May)	1.3	3.8	-1.1	11.9	-8.5	59	78	64	243.9
Winter (June-Aug.)	1.3	1.3	4.0	15.1	-12.3	80	77	62	187.2

The prevailing winds at South Georgia are from the west, north-west, and south-west, but easterly winds are frequent and severe during early summer. Features of the island's climatology are the westerly "Föhnwinds" which rush down the northern steep slopes of the mountains and across the fiords with "violence sufficient to carry moderate-sized stones over the level ground" (Skottsberg). They are often accompanied by a marked rise in temperature. The mean hourly velocity of the wind for the year is about 24.2 kilometers per hour (Mossman).

The following abstract of weather conditions during a single summer month is gleaned from writer's field notebook.

No account has been taken of temperatures, light winds, etc. In this table a "gale" signifies a wind of sufficient violence to prevent the launching of thirty-foot whaleboats from the anchored vessel.

BAY OF ISLES, LAT. 54° 03' S., LONG. 37° 27' W., JANUARY, 1913.

Prevailing Weather Conditions	Dates	Number of Days
Clear	6, 9, 10.	3
Fog	7, 16, 22.	3
Rain or snow	1, 3, 13, 14, 15, 16, 18, 19, 21, 22, 23, 26, 27, 28, 29, 30.	16
Heavy and prolonged snowstorms	1, 18, 30.	3
South-westerly	3, 9, 13, 15, 17, 19, 30.	7
Gales } W. or north-westerly	16, 25, 27, 28.	4
} Easterly	14, 18, 21.	3
} South-easterly	23.	1
Calm	7, 22, 26.	3
Frost	13.	1
Temperature of bay water	+2.2° C.	

PLANTS COLLECTED ON THE SOUTH GEORGIA
EXPEDITION.¹

BY NORMAN TAYLOR.

BROOKLYN, N. Y.

The most complete and recent account of the vegetation of South Georgia by Dr. Carl Skottsberg, credits only 214 species of plants to the island. These are distributed as follows: 10 vascular plants, 99 mosses, 36 hepatics, and 58 lichens. The number of species collected during the present expedition was 18, representing 6 species of vascular plants, 1 fungus, not before reported from South Georgia, 2 hepatics, 1 moss, and 8 lichens. The specimens representing the non-vascular groups have been sent to the specialists in those groups, and the specimens of vascular plants are deposited in the herbaria of the Brooklyn Botanic Garden and the New York Botanical Garden.

The list of species collected follows: The numbers referred to are Mr. Robert Cushman Murphy's field collection numbers.

VASCULAR PLANTS

POLYSTICHUM MOHRROIDES Plicatum (Bory) Poepp.
(Nos. 1519 and 1520.)

Collected at Bore Valley, Cumberland Bay. 150 M. Dec. 9, 1912.

This is the most distinctive of the three ferns found on the island. It is known throughout the Subantarctic.

FESTUCA ERECTA D'Urv. (No. 1861.)

Collected at Bay of Isles, February 24, 1913.

A common grass often forming with *Acacia*, a tundra vegetation; found in many other parts of the South Atlantic. Growing between hummocks of the tussock-grass, on the upper beach.

¹In the determination of species other than ferns and flowering plants, I have had the kind assistance of Mrs. L. G. Britton, Dr. M. A. Howe, Dr. R. H. Howe, Jr., and Dr. W. A. Merrill.

POA FLABELLATA (Lam.) Hook. (Nos. 1858, 1859 and 1769.)

Collected at Bay of Isles, February 24, 1913, and February 2, 1913.

The largest and most important of the flowering plants found on the island. It is the famous "tussock-grass" of the Subantarctic and is found on nearly every island where vegetation exists. Skottsberg says it makes practically pure associations in many parts of the island and its large, dense tussocks are distinctive features of the landscape. This and *Festuca erecta* often form a kind of peat.

RANUNCULUS BITERNATUS Sm. (Nos. 1919 and 1920.)

Collected at Possession Bay, March 13, 1913.

A small buttercup of moist or wet places, described by the collector as "growing in damp places such as along bases of cliffs beneath dripping icicles, etc."

ACAENA ADSCENDENS Vahl. (Nos. 1921, 1855, 1856 and 1857.)

Collected at Possession Bay, March 13, 1913, and at Bay of Isles.

Often flowering while the snow is still on the ground, and frequently making exclusive growths with *Festuca erecta*. According to Skottsberg the form found on South Georgia is the variety *austro-georgica* Bitter, but our specimens do not seem different from the typical *A. adscendens* Vahl, which is found throughout the Subantarctic. The variety described by Bitter is the only alleged endemic flowering plant known on the island, all the other undoubted endemic species being among the mosses, lichens and hepatics.

CALLITRICHE ANTARTICA Engelm. (Nos. 1764, 1768 and 1922.)

Collected at Bay of Isles, February 2, 1913, and at Possession Bay, March 13, 1913.

Appearing much like our northern *Callitriche* and growing in similar situations, also "in wet moss" (according to R. C. Murphy).

FUNGI.

MARASMIUS HEMATOCEPHALUS Mont. (No. 1788.)

Collected at Bay of Isles, February 5, 1913.

Mr. Murphy's notes say of this fungus "Growing about base

of tussocks. "These toadstools first appeared during the present week." (About the end of the summer). Not before reported from South Georgia, but it may be in the collections of Dr. Skottsberg, who writes that the fungi have not (1912) been included in his report of the vegetation of the island. The species is recorded by Dr. Murrill as of wide distribution in South America.

HEPATICS.

MARCHANTIA POLYMORPHA L. (No. 1863.)

Collected at Bay of Isles, February 24, 1913.

Growing on a perpendicular bank near the sea shore.

Dr. M. A. Howe considers the South Georgia specimen as the above species, although the only *Marchantia* reported by Skottsberg is *M. cephaloscypha* St.

PRASIOLA CALOPHYLLA (Carm.) Menegh.

Collected without number at Cumberland Bay, December 1, 1912.

MOSESSES.

ORTHOTRICHUM CRASSIFOLIUM Hook. and Wils. Collected at Cumberland Bay, without number, Dec. 1, 1912.

LICHENS.

LEPTOGIUM TREMELLOIDES (Linn. f.) Wain. and *PLACODIUM (CALOPLACA) ELEGANS* (Link) Nyl.

Both collected as number 1521 on rocks on the beach at Cumberland Bay, December 1, 1912.

USNEA (NEUROPOGON) SULPHUREA (Zoege) Th. Fr.

(No. 1770.)

Collected at Bay of Isles, February 2, 1913. Growing on a boulder near sea level.

CLADONIA BELLIDIFLORA var. *SUBULIFORMIS* (Wallr.) Rabenh.
(No. 1522.)

Collected on the slope of Bore Valley, Cumberland Bay, 200 M., December 9, 1912. (Determined by Dr. Riddle.)

There are also three more lichens, all collected under the number 1521, at Cumberland Bay, December 1, 1912, of which Dr. H. E. Hasse, in a letter to Dr. R. H. Howe, Jr., says "*Caloplaca callopisma* (Ach.) Th. Fr., *Buellia saxatilis* (Schaer.) Krbr. doubtful, spores are larger than those given in the books; and *Caloplaca murorum* (Hoffm.) Th. Fr. var. *major* (Wnbg.) Th. Fr."

Dr. Skottsberg, in his paper on the vegetation of South Georgia, which forms part of the reports of the Swedish South Polar Expedition, has applied the methods of Raunkiaer in studying the relation between the climate and the plants of the island. By grouping the species according to Raunkiaer's so-called "Growth Forms," an *ex post facto* method of determining climate from the amount and kind of bud protection exhibited by the plants during winter, he gets some interesting statistics. Of *chamæphytes* (plants perennating on the surface of the ground and thus protected by the snow blanket) there are 47%; of *hemicryptophytes* (plants having dormant buds in the upper crust of the soil), there are 40%; *cryptophytes* (plants with dormant parts subterranean), 7%; *therophytes* (annuals), 7%. These figures are based, of course, on the species of the island and not on the individuals, and to this extent the results are faulty, as any method of correlating climate and vegetation must be. For instance, the three most widely distributed and most frequent phanerogams, *Festuca crecta*, *Poa flabellata* and *Acacia adscendens* are all *chamæphytes* and would very seriously upset the above percentages if an individual census were the basis of calculation. The figures are of chief interest as related to similar figures for other regions, a comparison which lies outside the scope of this paper.

The expedition made a brief stop at Cape Verde Islands, where Mr. Murphy picked up *Zygophyllum simplex* L. (No. 1517) and *Acacia virgatum* L., both collected at St. Vincent. Sept. 17, 1912.

ANASTERIAS OCTORADIATA, NOUVELLE ASTÉRIE
DE LA GÉORGIE DU SUD.

PAR R. KOEHLER.

PROFESSEUR DE ZOOLOGIE A L'UNIVERSITÉ DE LYON.

M. Robert Cushman Murphy a bien voulu me remettre, pour en faire l'étude, une petite collection d'échinodermes recueillis par lui à la Géorgie du Sud, et comprenant trois Astéries et trois Holothuries. Parmi les Astéries, se trouvait un très bel échantillon d'une *Anasterias* à huit bras qui est nouvelle et que je décris ci-dessous; l'étiquette qui l'accompagnait portait "Bay of Isles, 4 fathoms, Jan. 1913." Les deux autres Astéries, de petite taille, consistent, l'une en un jeune *Odontaster validus* Koehler (Bay of Isle, 5 fathoms, 10 Jan. 1912) et une jeune *Anasterias* à cinq bras dont la détermination ne peut être faite avec certitude en raison de l'âge du sujet: je crois cependant ne pas me tromper en la rapportant à l'*A. Studeri* Perrier (Possession Bay, 8 Mar. 1913).

Les trois Holothuries appartiennent toutes à la même espèce, mais malheureusement leur détermination est impossible car les corpuscules calcaires ont été complètement dissous; elles se rapportent certainement au genre *Psolidium*, et je suppose que ce sont des *P. convergens* Hérouard. Elles proviennent également de Possession Bay.

L'*Anasterias*, à laquelle je propose de donner le nom d'*Anasterias octoradiata* pour rappeler son caractère extérieur le plus saillant, est d'assez grande taille: $R = 85$, $r = 20$ mm. (fig. 1 et 2). Les bras sont tous plus ou moins recourbés vers le haut au-dessus de la face dorsale du disque dans leur deuxième moitié, de telle sorte qu'on peut apercevoir leur région ventrale en regardant l'échantillon par en haut; ils sont à peu près tous égaux en longueur. Ils vont en s'amincissant assez régulièrement depuis leur base, un peu plus lentement dans leur première moitié et un peu plus rapidement dans leur deuxième moitié jusqu'à l'extrémité qui forme une pointe obtuse. La face dorsale du disque est assez fortement convexe et les bras offrent aussi une face dorsale très convexe. La face ventrale est plane.

Voici les principales dimensions que je relève sur l'échantillon :

<i>K</i>	85 mm.
<i>r</i>	21,5 "
Diamètre du disque	43 "
Longueur d'un bras	65 "
Largeur d'un bras à la base	17 "
Largeur du même bras vers le milieu.....	14 "
Largeur à 3 mm. de l'extrémité.....	6 "
Nombre des plaques marginales	52

La face dorsale du disque et des bras présente les caractères habituels des espèces du genre *Anasterias*, c'est-à-dire qu'elle est recouverte de pustules constituées par une large expansion cutanée, mamelonnée et à contours irréguliers, dans laquelle sont implantés des pédicellaires croisés, et au centre de laquelle se trouve un piquant. Ces pustules, de forme régulièrement arrondie, ou rendues polygonales par pression réciproque, sont assez inégales dans leurs dimensions, mais, d'une manière générale, elles sont d'assez grande taille, et sur le disque les plus grandes d'entre elles peuvent atteindre 3,5 et même 4 mm. de largeur. Leur taille devient un peu plus petite sur les bras, et leurs dimensions se réduisent progressivement à mesure qu'on se rapproche de l'extrémité, ainsi que sur les côtés des bras au voisinage des plaques marginales. L'arrangement des pustules reste également très irrégulier sur les bras, et l'on ne peut pas reconnaître la moindre indication de rangées longitudinales ou transversales. Les pustules sont très rapprochées les unes des autres: elles restent toutefois séparées par un intervalle très étroit, mais très distinct cependant, dans lequel se montrent des papules en nombre très variable. Sur le disque, ces papules sont peu nombreuses; elles sont un peu plus abondantes sur la face dorsale des bras, et elles se montrent surtout très abondantes sur les côtés des bras au voisinage des plaques marginales dorsales.

Au centre de chaque pustule, il existe un piquant qui est absolument invisible quand on regarde la face dorsale de l'Astérie, mais dont on peut facilement reconnaître l'existence en tâtant, à l'aide d'une aiguille, la région centrale de la pustule. On peut d'ailleurs mettre ces piquants très facilement à nu en écartant, ou en enlevant les tissus mous qui les cachent, et l'on reconnaît alors que ces piquants sont extrêmement courts, assez épais, et qu'ils offrent une partie basilaire rétrécie en forme de pédoncule tandis qu'ils se terminent par une tête arrondie; le diamètre de celle-ci est à peine inférieur à la hauteur totale du piquant. Au microscope cette tête se montre hérissée de spinules fortes et pointues (fig. 3 et 4). Le diamètre des têtes des plus grands piquants est de 1 mm. et la hauteur totale varie entre 1, 2 et 1, 3 mm. Ces piquants se montrent dans toutes les pustules du disque et des bras, et on les retrouve encore dans certaines pustules à l'extrémité de ceux-ci, mais ils disparaissent sur les très petites pustules de la pointe et des faces latérales des bras qui ne sont guère plus grosses que les papules voisines. On trouve assez souvent deux piquants dans les plus grandes pustules du disque.

Les pédicellaires croisés que l'on rencontre dans ces expansions cutanées ont la structure habituelle que l'on connaît dans le genre *Anasterias* (fig. 5, 6 et 7). Comparés à des pédicellaires d'une *A. tenera* Koehler de même rayon, ils me paraissent un peu plus petits, car ils ne dépassent guère 0, 4 mm. de longueur, au lieu d'atteindre 0, 5 à 0, 55 mm. comme dans cette dernière espèce (fig. 8 et 9). Je remarque en outre, sur les pédicellaires entiers, que les queues des valves sont moins allongées et qu'elles forment une saillie moins marquée dans l'espèce nouvelle que chez l'*A. tenera*. Ces différences peuvent d'ailleurs être individuelles et il n'y a pas lieu de leur attribuer une grande valeur.

Je n'ai pas pu distinguer de plaque madréporique.

Les pustules des faces latérales des bras, qui diminuent rapidement de taille à mesure qu'on s'approche de la face ventrale, s'arrêtent brusquement en abordant une rangée marginale de grosses pustules qui sont disposées sur toute la longueur des bras, en formant une rangée bien distincte et remarquable par leur alignement et la régularité de leur forme. Les pustules de cette rangée marginale dorsale sont quadrangulaires, avec les bords légèrement arrondis; elles sont aussi longues que larges, ou un peu plus hautes que larges dans la première moitié des bras, mais dans la deuxième moitié elles sont sensiblement plus hautes que larges. La structure est la même que celle des autres pustules, avec cette différence que le piquant central n'est pas complètement recouvert par le tissu mou et qu'on peut distinguer une partie de son extrémité arrondie au centre de la pustule sans toucher à celle-ci. Ces piquants conservent la même largeur sur toute leur longueur et leur forme est cylindrique sans renflement terminal; l'extrémité est seulement très convexe, mais les spinules qui la recouvrent sont plus courtes et moins pointues que dans les autres pustules de la face dorsale.

Ces pustules correspondent évidemment à une rangée de plaques marginales dorsales. A la limite entre la face latérale et la face ventrale, il existe une autre série de plaques marginales qui méritent le nom de marginales ventrales; ces dernières sont plus développées et plus apparentes que les dorsales, auxquelles elles correspondent cependant d'une manière régulière. Chacune de ces plaques porte deux gros piquants très forts et très saillants, et qui émergent sur les deux tiers de leur longueur au-dessus de l'expansion bourrée de pédicellaires croisés qui entoure leur base. Ces piquants sont épais et larges, très obtus, avec l'extrémité arrondie mais non capitée, et ils sont parfois légèrement aplatis. Ils deviennent moins saillants dans la deuxième moitié du bras. Les cinq ou six premières plaques de chaque série n'offrent qu'un seul piquant; de même au voisinage de l'extrémité des bras leur nombre se réduit également à un.

L'espace qui reste libre entre les deux rangées marginales atteint 3 mm. de hauteur à la base des bras, et il va en diminuant progressivement, de telle sorte qu'il est très réduit au milieu de la longueur du

bras où les deux rangées deviennent dès lors à peu près contiguës. Cet espace triangulaire est occupé par un petit nombre de papules peu serrées, au milieu desquelles se montrent des pédicellaires droits.

Entre la rangée marginale ventrale et les piquants adambulacraires, il existe également, à la base des bras, un petit espace triangulaire libre, mais beaucoup moins important que le précédent, et qui ne dépasse guère 2 centimètres de longueur. On y rencontre aussi quelques papules entremêlées de pédicellaires droits peu nombreux.

Le sillon ambulacraire est très large et montre les quatre rangées habituelles de tubes. Les piquants adambulacraires sont disposés très régulièrement en une rangée unique. Ils sont épais, avec l'extrémité obtuse et arrondie, légèrement aplatis dans le sens transversal. Entre ces piquants, ou dans le sillon lui-même, on aperçoit çà et là de gros pédicellaires droits dont les valves atteignent une longueur de 1, 25 à 1, 3 mm.

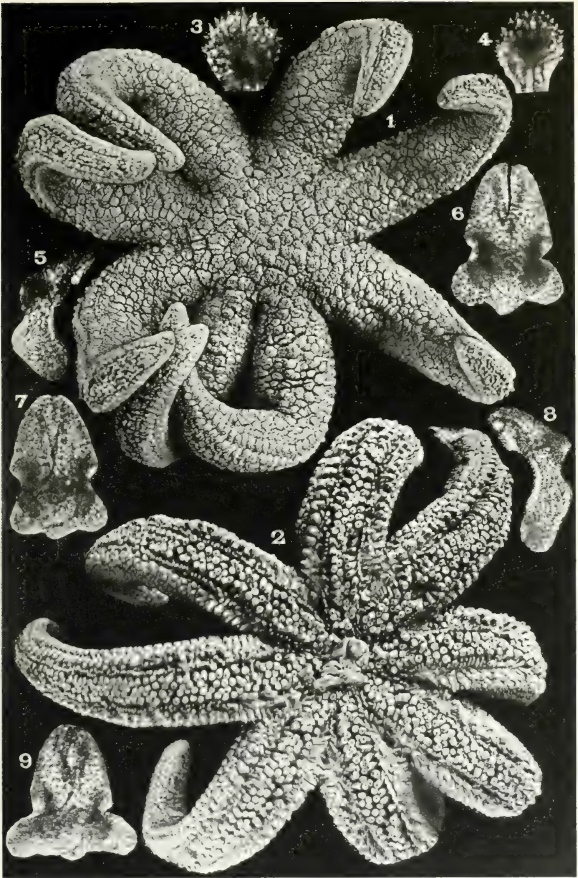
L'échantillon a pris dans le liquide conservateur une couleur ferrugineuse; il m'a été envoyé dans une boîte en fer blanc et le liquide était fortement teinté par de la rouille.

RAPPORTS ET DIFFÉRENCES.—L'*A. octoradiata* est une forme extrêmement intéressante: le genre *Anasterias* n'était en effet, connu jusqu'à maintenant que par des espèces à cinq bras; aussi l'Astérie rapportée par M. Robert Cushman Murphy se distingue-t-elle, au premier coup d'oeil, de toutes les autres espèces du genre. Comparée à l'*A. tenera*, elle offre une structure générale plus robuste avec des bras plus amincis et plus pointus. Les pustules sont plus grandes et chacune d'elles renferme un gros piquant très court et épais, terminé par une tête arrondie.

On pourrait se demander si le *Pedicellaster octoradiatus*, que Studer a décrit en 1885 d'après un échantillon très petit, ($R = 6$ mm), provenant également de la Géorgie du Sud, ne serait pas le jeune de l'*Anasterias octoradiata*. Je n'ai pas cru devoir m'arrêter à cette hypothèse car je ne crois pas que l'Astérie décrite par Studer puisse être rangée dans le genre *Anasterias*: l'auteur indique en effet l'existence sur la face dorsale, d'un réseau calcaire, irrégulier dans la partie centrale du disque et formant sur les bras trois bandes distinctes; de plus les tubes ambulacraires sont disposés en deux séries seulement. Ces caractères ne permettent pas de ranger cette jeune Astérie dans le genre *Anasterias*.

EXPLICATION DE LA PLANCHE.

- Fig. 1. *Anasterias octoradiata*. Face dorsale légèrement réduite.
Fig. 2. *Anasterias octoradiata*. Face ventrale légèrement réduite.
Fig. 3. *Anasterias octoradiata*. Extrémité renflée du piquant occupant le milieu d'une pustule de la face dorsale du dique. Grossissement 18.
Fig. 4. *Anasterias octoradiata*. Extrémité du piquant provenant d'une pustule plus petite. Grossissement 18.
Fig. 5. *Anasterias octoradiata*. Valve isolée d'un pédicellaire croisé. Grossissement 110.
Fig. 6 et 7. *Anasterias octoradiata*. Deux pédicellaires croisés entiers. Grossissement 110.
Fig. 8. *Anasterias tenera*. Valve isolée d'un pédicellaire croisé. Grossissement 70.
Fig. 9. *Anasterias tenera*. Pédicellaire croisé entier. Grossissement 70.



R. KOEHLER, Phot.

ANASTERIAS OCTORADIATA SP. NOV.

MOLLUSCA FROM SOUTH GEORGIA.

BY WM. H. DALL,

CURATOR DIV. MOLLUSKS U. S. NAT. MUSEUM.

CEPHALOPODA.

Numerous beaks of cephalopods were found in stomachs of the sea elephant (*Mirounga leonina*), but the genus and species in default of other material are indeterminable.

GASTROPODA.

Genus NEOBUCCINUM E. A. Smith, 1877.

-Chlamidota E. von Martens, 1879.

NEOBUCCINUM DENSICLATHRATUM v. Martens.

Common *-Chlamidota densiclathrata* von Martens, Jahrb. d. Hamburgischen Wiss. Anstalten, III, 1889, p. 71, pl. 1, fig. 1-7.

Numerous living specimens from four fathoms, Bay of Islands.

Genus EATONIELLA Dall, 1876.

EATONIELLA KERQUELENENSIS E. A. Smith.

Not found *-kerqueleuensis* E. A. Smith, Ann. Mag. Nat. Hist. XVI, 1878, p. 70, Jahrb. d. d. p. 74, pl. 2, fig. 51-55, 1889.

Common in the shore drift at Prince Olaf's Harbor.

Genus NACELLA Schumacher.

NACELLA POLARIS Hombron and Jacquinot.

Patella polaris H. & J. Ann. des Sci. Nat. (ii) XVI, p. 191, 1841. Jahrb. l. c. p. 101, pl. II, f. 111-112, 120-121, 123-124, 1886.

Patella fucgiensis Reeve, Conch. Iconica, Patella, fig. 73, 1845.

Dead specimens were obtained from the hill-tops at Possession Bay, where they were carried by the kelp gulls (*Larus dominicanus*) of which they form the chief food. This species lives on the giant kelp of this region and young specimens were found living at the Bay of Islands. [R. C. M.]

The variety *fucgiensis* is flatter and more strongly sculptured than the typical form but that the two forms are united by a gradual series of modifications is quite obvious in a good series of specimens.

PHOTINULA EXPANSA Sowerby.

Margarita expansa Sowerby, Conch. Ill., Margarita, fig. 16—17, 1839.

Margarita hillii Forbes, Proc. Zool. Soc. London, 1850, p. 272, pl. 11, fig. 10.

PELECYPODA.

Genus CYAMUM Philippi.

CYAMUM MOSTHAFFII Pfeffer.

Cyamum mosthaffii Pfeffer, Jahrb. l. c., p. 118, pl. 1, fig. 4a—b, 1898.

Shore drift at Prince Olaf's Harbor.

The hinge of this species does not agree with that of the typical *Cyamum antarcticum* of Philippi, as the teeth are more or less obsolete and not bifid; the ligament is strong, not obsolete; and the form Leptonoid rather than Tellinoid. Still in the absence of more accurate information as to the variations in the genus it is perhaps best not to remove the present species from Philippi's genus.

Genus MODIOLARCA Gray.

MODIOLARCA SUBQUADRATA Pfeffer.

Modiolarca subquadrata Pfeffer, Jahrb. l. c., p. 121, pl. 4, 8a—c, o, 1886.

Modiolarca exilis von Martens, not A. Adams.

Shore drift at Prince Olaf's Harbor.

MODIOLARCA (KIDDERIA ?) BICOLOR von Martens.

Modiolarca bicolor von Martens, Jahrb. l. c., p. 127, pl. 4, fig. 12a—d, 1886.

Shore drift at Prince Olaf's Harbor.

THE MALE OF *PANDARUS SATYRUS* DANA

BY CHARLES B. WILSON

WASHINGTON, 1908.

PANDARUS SATYRUS Dana.*Pandarus satyrus* Dana, 1852, p. 4368; pl. 95, fig. 2, 3 to 5.*Pandarus satyrus* Wilson, 1907, p. 415, pl. 31.

HOST AND RECORD OF SPECIMENS. Fifteen females with egg strings and two males were obtained from the pectoral fins of a large shark in the Atlantic Ocean, Lat. $6^{\circ} 40''$ N., Long. $24^{\circ} 35''$ W., Oct. 9, 1912, by Robert Cushman Murphy. The male of this species has never before been obtained, and hence a complete description of it is here given.

SPECIFIC CHARACTERS OF MALE. Carapace one-fifth wider than long, including the posterior lobes; lateral margins strongly convex; frontal plates considerably widened toward the outer ends, and entirely covering the basal joints of the first antennæ; posterior lobes wide, triangular, very bluntly rounded, and curved inward at the tips, which reach the posterior margin of the third thorax segment; grooves separating the cephalic and lateral areas shallow and indistinct; posterior margin straight; eyes invisible in the mature adult. The three free thorax segments together only three-fifths as long as the carapace, the second segment slightly wider than the third and fourth, which are about equal, the fourth segment the longest, its sides roundly pointed, and its posterior margin overlapping the genital segment. The latter is wider than long, spindle-shaped, with a pair of lateral and a pair of posterior lobes; it is not narrowed into a neck anteriorly where it joins the fourth segment, as is the case in *Pandarus cranchii*. The lateral lobes are small and triangular, and are armed with a larger terminal spine and several smaller ones along the inner margin. The posterior lobes are much larger, triangular, tapered to an acuminate point, and curved inward; the sixth legs are just inside the bases of these lobes on the posterior margin of the segment. Abdomen two-jointed, joints the same length, the basal one a trifle the wider; anal laminae

each nearly as large as one of the abdomen joints, obliquely truncated posteriorly and armed with four setæ, of which the inner one is the smallest, and is removed a little from the other three.

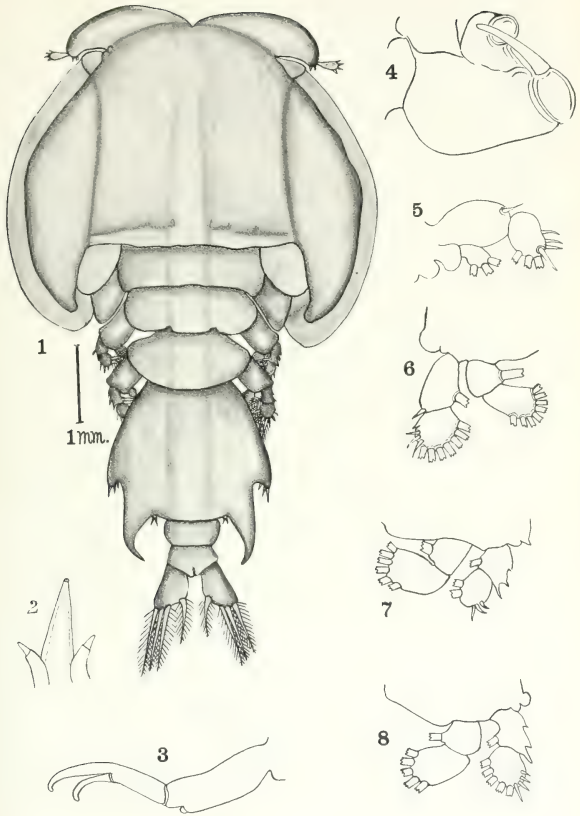
First antennæ very small and armed with short spines; second antennæ with a long terminal claw abruptly bent near its tip. Adhesion pads similar to those of the female, but smaller. First maxillæ bent outward away from the mouth-tube in a half circle like those of *Pandarus cranchii*; second maxillæ rather stout. Maxillipeds of moderate size; terminal claw long and slender, shutting down inside the immovable knobs, the space between the base of the claw and the knobs being greater than in any known species. Spines and setæ on the swimming legs arranged as follows: First exopod 1—0; 4—III; endopod 0—0; 0—III; second exopod 1—1; 3—VII; endopod 0—1; 0—VIII; third exopod 2—1; 3—II; endopod 0—1; 0—VI; fourth exopod 2—1; 4—V; endopod 0—1; 0—V.

Total length 8 mm. Length of carapace on midline 3 mm.; width 4.8 mm. Length of three free segments 1.8 mm.—of genital segment 2.2 mm.—of abdomen 1 mm.

This male resembles that of *Pandarus cranchii* more than of any other species, but the two may be easily distinguished by the relative length of the three free thorax segments, by the lateral appendages on the first of these segments, by the presence or lack of a neck on the anterior end of the genital segment and by the size and shape of the secondary lobes on the posterior margin of the carapace.

EXPLANATION OF PLATE.

Fig. 1, Dorsal view of male of *Pandarus satrens*. Fig. 2, Mouth-tube and first maxillæ. Fig. 3, Second maxilla. Fig. 4, Maxilliped. Figs. 5 to 8, First, second, third, and fourth swimming legs.



THE MALE OF *PANDARUS SATYRUS* DANA

AMPHIPODS OF THE SOUTH GEORGIA EXPEDITION.

BY CLARENCE R. SHOEMAKER,
WASHINGTON, D. C.

Ten species are represented in the collection, five of which were taken by the German Expedition to South Georgia in 1882-83, and four of which appear to be additions to the fauna of the island. The remaining species *Eutyphis faba* was collected in the South Tropical Atlantic.

List of species reported by Dr. Pfeffer.

Old Names:

New Names:

<i>Anonyx zschaui</i> Pfeffer	= <i>Waldeckia zschaui</i> (Pfeffer)
<i>Eurymera monticulosa</i> Pfeffer	= <i>Eurymera monticulosa</i> Pfeffer
<i>Boxallia gigantea</i> Pfeffer	= <i>Boxallia monticuloides</i> (Haswell)
<i>Stebbingia gregaria</i> Pfeffer	= <i>Paramocra austrina</i> (Bate)
<i>Calliopius georgianus</i> Pfeffer	= <i>Apherusa georgiana</i> (Pfeffer)

List of species new to the islands.

Tegophrusa keenei Miers.

Atylodes magellanica (Stebbing)

Djerboa furcipes Chevreux

Neuhausia macleayi Dana.

Some of the specimens differ slightly from published descriptions and figures and these differences will be mentioned in the following remarks under the different species.

WALDECKIA ZSCHAUI (Pfeffer)

Bay of Isles, Jan. 10, 1913; 5 fathoms.

These specimens agree very closely with Pfeffer's figures. The fourth side-plates are exactly like these in the figure given by Pfeffer and not nearly so deep nor so much produced backward as those of *H. obesa* as figured by Chevreux.

The anterior gnathopods agree with Pfeffer's figure but not with that of Chevreux for *H. obesa*.

TRYPTIOSA KERGUELENT (Miers).

Bay of Isles, Jan. 10, 1913; 5 fathoms.

This species has not been recorded from South Georgia but there can be little doubt of the identity as the specimens agree quite closely with Stebbing's description and figures.

EURYMERA MONTICULOSA Pfeffer.

Bay of Isles, Jan. 10, 1913; 5 fathoms.

Possession Bay, Mar. 8, 1913.

The specimens agree very well with Pfeffer's figures.

BOVALLEA MONOCULOIDES (Haswell).

Bay of Isles, Jan. 10, 1913; 5 fathoms.

Possession Bay, Mar. 8, 1913.

There were two specimens taken, the larger of which has lost the head.

The larger, which measures about 30 mm. agrees well with the figures of Chevreux and Pfeffer. The telson, however, is divided nearly to its base.

The smaller, which measures about 15 mm. differs in some respects from both Chevreux's and Pfeffer's figures and agrees more closely with *Atylus antarcticus* Walker. As this specimen is only about half the length of those described by them these differences may be due to age. The last three segments of the peræon and the first two of the pleon have a dorsal carina, but they are not quite so acute as those of *A. antarcticus*. The third segment of the pleon has a blunt dorsal tooth and the posterior margin forms a continuous curve with the lower margin. There is no tooth on the lower posterior margin as shown in the figures of Pfeffer and Chevreux.

The gnathopods differ from their figures. The first pair is slightly smaller than the second. The palms of both pairs which are slightly convex and nearly half the length of the hind margins of the hands, form a continuous curve with those margins.

The telson is very much the shape of that of *A. antarcticus*. It is cleft about one-third of its length with each division bearing a seta and a setule on its apex.

ATYLOIDES MAGELLANICA (Stebbing).

Bay of Isles, Jan. 10, 1913; 5 fathoms.

This specimen agrees very well with Stebbing's description and figures, but the gnathopods, telson, and third uropods agree much more closely with Walker's figures. This species appears to be quite variable.

PARAMERA AUSTRINA (Bate).

Possession Bay, Mar. 8, 1913.

These specimens differ in some particulars from both *Atyloides australis* (Miers) as described and figured by Stebbing in the Challenger Report, and *Stebbingia gregaria* Pfeffer. This species seems, however, to be extremely variable.

APHERUSA GEORGIANA (Pfeffer).

Bay of Isles, Jan. 10, 1913; 5 fathoms.

The specimens are very young, but agree fairly well with the description and figure given by Pfeffer.

DJERBOA FURCIPES Chevreux.

Bay of Isles, Jan. 10, 1913; 5 fathoms.

This species has not been reported from South Georgia, but specimens have been taken at Booth-Wandel and South Orkneys. It agrees well with Chevreux's figures.

EUTYPHEUS LARA (Dana) ♀

South tropical Atlantic.

The specimen agrees with Dana's description and figures except in two points. The fifth and sixth limbs are not reduced

merely to broad coxal plates. The coxae are developed into long broad plates having weak, but well developed limbs on their inner surfaces. The seventh limbs with their coxal plates as shown in Dana's figure are wanting. These, however, may have been lost as the specimen was found in the mouth of *Coryphæna hippurus*.

TAURIA MACROCEPHALA Dana?

Bay of Isles, Feb. 23, 1913.

From tentacles of jelly fish.

The specimens agree very well with Dana's description and figures in most points. The carpus of the second gnathopod is not long and narrow as shown in the figures, but is broader distally than the carpus of the first and the lower anterior angle is somewhat produced.

The subequal antennæ of the female are about one-third as long as the height of the head and the flagella of the first antennæ, which are about three times as long as their peduncle, are somewhat flattened laterally and are unsegmented. The flagella of the second pair are about equal in length to their peduncles and are also unsegmented.

The fourth epimerals are about twice the height of the others with the sides rounding and produced below to a sharp point.

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ARACHNIDA FROM SOUTH GEORGIA.

By NATHAN BANKS.

WASHINGTON, D. C.

In the small collection sent me by Mr. Murphy are five species, four mites, and a spider; the latter I have described as new, although a considerable number of species are known from the Antarctic regions.

ACARINA.

RELAGIDA KERQUELENENSIS Cambr.

Several specimens; probably widely distributed in the Antarctic regions.

IDELLA SYMMETRICA Kramer

One broken specimen, probably this species.

HALACARUS SP.

A broken specimen.

CERATINODES PECTUS Cambr.

Several specimens from *Phalacrocorax atriceps georgianus* Lönnberg.

ARANEIDA.

NOTIOMASO gen. nov.

A micro-theriidid related to *Maso*.

About seven or eight bristles beneath tibia I, about six or seven beneath the metatarsus, the middle ones longer than those at either end. Anterior median eyes smaller than the others, posterior median eyes rather larger than lateral eyes; posterior eye row slightly procurved, the anterior row about straight; head not elevated in the male; hind coxae separated by sternum; leg III much shorter than leg II, leg I subequal to leg IV. Type, the following species.



Notiomaso australis gen. et sp. nov. Leg. I, claws, male palpus, eyes, and vulva

NOTIOMASO AUSTRALIS sp. nov.

Cephalothorax yellowish brown, rather darker in front, black in eye-region. P. M. E. not one-half their diameter apart, A. M. E. nearly diameter apart. Mandibles pale; legs pale yellowish, unmarked, very hairy; sternum black; abdomen blackish above, with faint pale stripe each side on basal part, and followed by a median series of narrow pale chevrons; venter black; vulva with a large corneous reddish black area, the anterior edge a raised, concave ridge; behind are two pale transverse cavities and a broad plate; the male palpi are short, the tibia with a large long acute process on the outer side; the style is long and spirally curved. Length: 2.5 mm., ♀ 3 mm.

From Possession Bay, South Georgia Island (R. C. Murphy coll.).

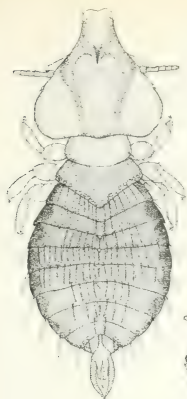
MALLOPHAGA FROM BIRDS OF THE SOUTH
ATLANTIC.

BY VERNON L. KELLOGG,

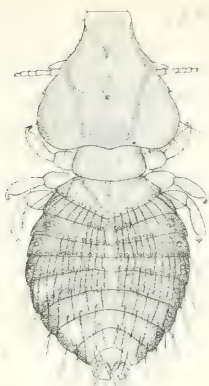
STANFORD UNIVERSITY, CALIFORNIA.

A small but interesting collection of Mallophaga taken from birds, mostly strictly maritime, of the Tropical and South Atlantic in the vicinity of South Georgia, Fernando Noronha, Trinidad, and the Cape Verde Islands, has been put into my hands for determination by Mr. Chas. Schaeffer of the Central Museum of the Brooklyn Institute of Arts and Sciences. The birds were collected by Mr. Robert C. Murphy on his South Georgia Island Expedition in 1912-13 and determined by him. The numbers preceded by the initials "R. C. M.," which I have used in connection with the birds' names, indicate the collector's field numbers, each one referring to Mallophaga from a single bird specimen. Twenty-five species of birds represented by twenty-eight specimens make up the host list, and twenty species of Mallophaga, of which four are new, and are here described, compose the list of parasites.

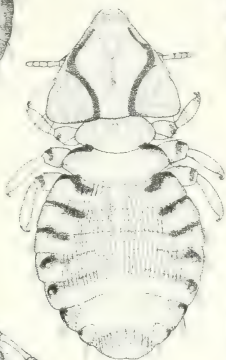
Among the species of special interest, besides the four new ones, is especially to be noted the species named *Nirmus setosus* by Giebel in 1876 (Ann. Mag. Nat. Hist., Vol. 17, p. 388, and more fully described by him and figured in 1879 in Phil. Trans. Roy. Soc., Vol. 168, extra vol. pp. 253-254, pl. XIV, fig. 18). Giebel had six specimens, probably all females, collected from *Pelicanoides urinatrix* at Kerguelen Id. in 1874 by the famous English Transit of Venus Expedition of which the Rev. A. E. Eaton was naturalist. It was the collections made by Eaton on this expedition which yielded such a wealth of interesting aberrant new forms of insects and other animals and plants as to make the wild little volcanic island of Kerguelen, a famous one to all naturalists. A male specimen, in Mr. Murphy's collection, of this curious Mallophagan from its equally curious host (*Pelicanoides*) reveals it to be a *Lipeurus* and not a *Nirmus*, and as the



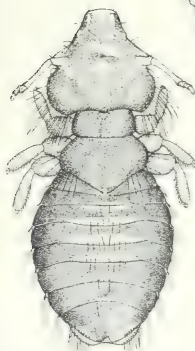
1



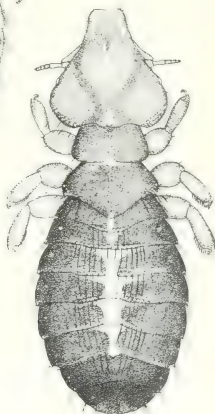
2



3



4



5

1. *DOCOPHORUS ATLANTICUS* ? 2. *DOCOPHORUS VIRIDICOLA* ?

3. *DOCOPHORUS PERSPICUUS* ?

4. *EURYMETOPUS MURPHYI* ? 5. *EURYMETOPUS MURPHYI* ?

species named *setosus* is already preoccupied in the genus *Lipeurus* I have had to find a new name for the species. I am calling it *Lipeurus catoni*.

In this connection it may also be noted that the figures of Giebel's *Docophorus dentatus* from *Diomedea exulans* on Pl. XIV of this same volume (168, extra vol.) of the Transactions of the Royal Society, are plainly made from specimens of the well known albatross parasite *Eurymetopus taurus*. The figure marked 16♂ is of a female *E. taurus* and that marked 16♀ is of an immature specimen, probably male. Also the figure 17 of the same plate illustrating his species *Nirmus angulicollis* from *Diomedea exulans*, looks suspiciously like a female *Lipeurus*, and is, I am inclined to think, the same species described by Kuwana and myself in 1900 (Proc. Acad. Nat. Sci., Philadelphia, Vol. 23, pp. 155-156, pl. VII, fig. 3) as *Lipeurus macilhennyi*, from a single female taken from *Diomedea nigripes*, collected at Pt. Barrow, Alaska. If so, the species becomes *Lipeurus angulicollis* Giebel.

The determinations and descriptions of the parasites of the South Georgia Expedition with their host records follow and are followed in turn by a host list with accredited parasites.

DOCOPHORUS LARI N. var. PARVA Piaget.

Four specimens of this small form of the widely distributed and abundant parasite of gulls, taken from *Larus dominicanus* (South Georgia Id.; R. C. M., 1718).

DOCOPHORUS ATLANTICUS sp. nov.

Males and females from *Stercorarius crepidatus* (North Tropical Atlantic; R. C. M., 1279, 1298), and from *Sterna paradisea* (South Atlantic; R. C. M., 1398). This well marked new *Docophorus* from terns is a form somewhat between *D. pustulosus* and *D. laricola*, with an emarginate clypeus but one not deeply and sharply emarginated as in *laricola*. Its male lacks the characteristic genital folds of the male *pustulosus*. It most closely resembles *D. snyderi* Kellogg & Paine, described in 1910 (Ent. News, Vol. 21, pp. 124-125, 2 figs.) from *Sterna lunata* (Laysan Id. Pacific

Ocean). Indeed it is not at all certain that I should describe the present specimens as representing a new species. But as I examine groups of specimens of the two lots I can easily and surely distinguish them as of two distinct forms. The Atlantic specimens are regularly larger, darker, with more pronounced markings, more produced anterior part of head, more strongly angulated metathorax and less angulated prothorax. The arrangement of the hairs and prickles of the lateral margins of the head is different, the male genitalia are not identical, etc., etc. But it is all very difficult and wearying, this constant attempt to give limits to a species; this constant attempt to conventionalize unconventional Nature.

Male, length 2.3 mm., width .99 mm.; head, length .82 mm., width .82 mm.; head and prothorax dark golden brown, metathorax and abdomen pitchy brown. Head with produced clypeus, with narrow clear anterior margin with shallow rounding emargination; signature distinct with posterior point unusually produced, acute and blackish; only two short prickles on either side of clypeus; antennæ with 2nd segment as long as 3rd and 4th together; temporal and occipital region broad; four inconspicuous hairs on each postero-lateral temporal margin and a longish hair from each eye; occipital bands fairly distinct.

Prothorax flatly rounded behind, metathorax sharply angulated; posterior margin of metathorax with conspicuous series of pustulated hairs. Abdomen about as broad as long, and with series of pustulated hairs along posterior margin of each segment, as shown in fig. 1; pleura of abdomen projecting laterally so as to give the lateral margins of the abdomen almost a serrate appearance; transverse blotches blackish brown, covering the whole dorsal surface and thus giving the dorsum of the whole abdomen a continuous blackish or pitchy brown color.

Female, length 2.4 mm., width 1.06 mm.; head, length .82, width .82; dorsum of first abdominal segment entirely covered by the transverse blotches, blotches of 2nd segment not quite meeting at middle, and of 3rd, 4th and 5th more widely separated, of 6th about as wide apart as of 2nd, and of 7th, 8th and 9th entirely covering the dorsum of each segment.

DOCOPHORUS VIRIDICOLA sp. nov.

One male specimen from *Numenius* sp. (Cape Verde Ids.; R. C. M., 1265), having some points of resemblance with *D. cephaloxus* Denny. Rudow has described two species of *Docophorus* from *Numenius*, which no one can recognize from his descriptions. Johnston and Harrison have also described (1912) two species of *Docophorus* from *Numenius*

variegatus from the Kermadec Ids. One of these, *numenicola*, described from two females, must be very much like my *D. fuliginosus* from *Charadrius squatarola* (New Mall. II, pp. 80-82, pl. III, fig. 2, 1896). To the other, *armatus*, I can almost assign my present specimen, and perhaps ought to. But my specimen is decidedly larger than the type male, the clypeus is squarely truncate instead of flatly convex, the metathorax is distinctly though flatly angulated behind instead of being rounded, and the transverse blotches on the dorsum of the abdomen cover practically the whole surface. A comparison of the types, however, might readily throw the two species together.

Male, length 2.09 mm.; width .97; head, length .76 mm., width .79 mm.; head, thorax and legs dark golden brown with dark brown markings, abdomen blackish brown with the small whitish pustulations at bases of the many hairs showing rather distinctly.

Head a little wider than long, with a few short prickly hairs on each lateral margin in front of the trabeculae, and with two longish and two or three short hairs on each temporal margin; the antennal and occipital bands are distinctly indicated and plainly separated by a clear line; the clypeal signature is distinct with short, acute, dark brown point.

Prothorax short and broad, with lateral margins only slightly diverging and bordered with dark brown; a single hair in each postero-lateral angle. Metathorax broad and not long, with the posterior margin obtusely but distinctly angulated (a little sharper than shown in figure) at the middle; a series of nine pustulated hairs along the posterior margin on each side of the median angle; a V-shaped dark brown marking on the disc of the dorsum with its two lines not parallel with the posterior margin of the segment but meeting at a sharper angle in the middle.

Abdomen short and broad (as broad as long) and almost wholly covered by the dark brown transverse blotches; series of pustulated hairs occur along the posterior margins of the segments to the number and of the character shown by fig. 2.

DOCOPHORUS PERSPICUUS sp. nov.

Two specimens, one male and one female, of this extraordinary white-bodied, black-banded new *Docophorus*, were taken from *Corvus* (corone ?) (Cape Verde Ids.; R. C. M., 1263). It is like nothing else, not even any of the several other strongly marked Corvine *Docophori*. Its milky white ground color and sharp blackish markings are indeed approached by the typical Corvine-infesting *Docophori*, but

its white-and-blackness are really quite different from that of *D. atratus* or similar typical species of the crows, and its minute trabeculae, in particular, set it apart from all these species.

Female, length 2.7 mm.; width 1.59 mm.; head, length .88 mm., width 1. mm.; ground color milky white, with strong blackish brown bands on head and blotches on thorax, legs and abdomen, but the abdominal blotches small and fading out on the posterior segments.

Head with margins forming almost an equilateral triangle but with base (occipital margin) longer than the sides (lateral margins), and with the anterior angle abruptly but not widely truncate; a few small prickly-hairs in front of clypeal suture, a longish hair from each eye and three not very long hairs on each temporal margin; trabeculae very small; antennae small; a pair of very well marked blackish brown occipital bands continued as antennal bands, running forward to the clypeal sutures, these bands of even width and sharp distinctness throughout their length; even beyond the sutures two small blotches may be looked on as continuations of these bands.

Prothorax very short and with flatly rounded posterior margin without blotches. Metathorax rather of shape of prothorax but larger and with the curving outlines more marked; its posterior margin is flatly rounded and bears an obscure series of short fine hairs, about seven on each side of the middle; there are also two short weak hairs in each lateral angle; a dark blotch in each antero-lateral angle; legs with small blackish semi-annular markings at tip of each femur.

Abdomen short and broad, not hairy, although there are series of inconspicuous weak hairs along the posterior margins of the dorsal surface of the segments; segments 1 to 6 each have a narrow, elongate diagonal lateral blotch enclosing or adjacent to the spiracle on each side, these blotches growing less in size and conspicuousness from the first segment backward; genital blotches, on the ventral surface, consisting simply of three very small but distinct flecks, one lying between the other two as if guarded by them.

Male, length 2.33 mm.; width, 1.27 mm.; head, length, .82 mm., width .97 mm.; the lesser size is especially noticeable in the abdomen; the lateral blotches of the abdomen are larger and are distinct on all the segments; the genitalia of unusual form, the parameres being short, thick and far apart.

NIRMUS TRIANGULATUS Nitzsch, var. ALPHA, var. NOV.

Males and females from *Megalestris antarctica* (South Tropical Atlantic; R. C. M., 1302) and from *Oceanodroma leucorhoa* (North Tropical Atlantic; R. C. M., 1299).

The new variety of this *Nirmus* of various gulls and terns has a head less narrowed at the front and broader in proportion to its length than in the species type.

LIPEURUS DENSUS Kellogg.

One adult female and one young male of this species from *Diomedea exulans* (South Atlantic; R. C. M., 1380). The species was described by me in 1896 from specimens from *Diomedea albatrus*, coast of California, U. S. A.

LIPEURUS DIVERSUS Kellogg.

Specimens from *Diomedea melanophrys* (South Atlantic; R. C. M., 1406), *Estrelata mollis* (South Atlantic; R. C. M., 1396, 1943), *Æstrelata incerta* (South Atlantic; R. C. M., 1390), *Puffinus cinereus* (South Atlantic; R. C. M., 1394), *Puffinus anglorum* (South Atlantic; R. C. M., 1381) and *Sterna paradisica* (South Atlantic; R. C. M., 1398).

LIPEURUS GRANDIS Piaget.

Males and females from *Megalestris antarctica* (South Tropical Atlantic; R. C. M., 1362). The species was described from specimens from *Procellaria pelagica*, and I have (with Chapman) described specimens of probably the same species from *Stercorarius* and *Puffinus* from the coast of California as a new species called *L. laculatus* (New Mall. III, pp. 93-95, pl. VII, fig. 1, 1899).

LIPEURUS GAINI Neumann.

Males and females from *Diomedea melanophrys* (South Atlantic; R. C. M., 1406), *Ossifraga gigantea* (South Atlantic; R. C. M., 1383) and *Thalassogeron chlororhynchus* (South Atlantic; R. C. M., 1405). The species was described by Neumann from specimens of *Ossifraga gigantea* taken at Petermann's Id. in 1909 by Charcot's Second French Antarctic Expedition.

LIPEURUS CELER Kellogg.

One male and one female from *Priocella glacialis* (South Georgia Id.). The species was described by me originally from *Fulmarus glacialis*, coast of California, U. S. A. In both of the specimens the head is more flattened on the clypeal front than in the type of *celer*.

LIPEURUS FULIGINOSUS Taschenberg.

Males and females from *Ossifraga gigantea* (South Atlantic; R. C. M., 1383), *Puffinus cinereus* (South Atlantic;

R. C. M., 1394), *Gistrelata mollis* (South Atlantic; R. C. M., 1396, 1943), *Gistrelata incerta* (South Atlantic; R. C. M., 1390), *Thalassogeron chlororhynchus* (South Atlantic; R. C. M., 1405), *Majaqueus aquinoctialis* (South Atlantic; R. C. M., 1382) *Sterna paradisca* (South Atlantic; R. C. M., 1398). The species was described by Taschenberg from *Diomedea exulans* and *D. chlororhyncha*, and is much like Giebel's *Lipeurus clypeatus* from *Pachyptila carulca*.

LIPEURUS GURLETI Taschenberg.

Males and females from *Daption capensis* (South Atlantic; R. C. M., 1384). This species was described by Taschenberg from the same host, and has also been recorded by Neumann from the same host.

LIPEURUS GRACILICORNIS Piaget var. *MINOR* Kellogg.

Specimens from *Fregata ariel* (Trinidad Islet, South Atlantic; R. C. M., 1887) and *Phaethon lepturus* (Fernando Noronha Id. South Atlantic; R. C. M., 1358).

LIPEURUS EXTENSUS Kellogg nom. nov.

Three females and one male of this curious *Lipeurus* which was diagnosed by Giebel in 1876 (Am. Mag. Nat. Hist., Vol. XVII, p. 388) and fully described by him in 1879 (Phil. Trans. Roy. Soc., Vol. 168, extra volume, pp. 253-254, Pl. XIV, fig. 18) as *Nirmus setosus*, are in Mr. Murphy's collection. Giebel's descriptions were made from six specimens, two of them immature, taken from the diving petrel, *Pelicanoides urinatrix*, on Oct. 14, 1874, at Observatory Bay, Kerguelen Id., by members of the English Transit of Venus Expedition of which Rev. A. E. Eaton was naturalist. Probably all of Giebel's specimens were females, which led him to describe the species as a *Nirmus* instead of assigning it to *Lipeurus* where it certainly belongs, if no new genus is erected for it. The secondary sex differences of the antennæ are revealed by the male specimen now in my hands. But they are differences much less than shown by most *Lipeuri*, consisting only of an enlargement of the first (especially) and third segments, without the presence of a projecting process on either of them. Perhaps, therefore, the species ought not to be put with the *Lipeuri* but most certainly it

cannot go with the *Nirmi*. As *setosus* is already preoccupied in the genus *Lipeurus*, I am renaming the species *catoni*. Of the specimens in Mr. Murphy's collection two females and the male were taken from *Pelecanoides urinatrix* (South Georgia Island; R. C. M., 1877) and one female from *Oceanodroma leucorhoa* (North Tropical Atlantic; R. C. M., 1303).

EURYMETOPUS TAURUS DuRoi.

Males and females from *Diomedea exulans* (South Atlantic; R. C. M., 1380) and *Æstrclata mollis* (South Atlantic; R. C. M., 1943).

EURYMETOPUS MURPHYI sp. nov.

It is more than high time to stop referring all the species of *Eurymetopus* to the single species *taurus*. From my own specimens and from letters from my correspondents, especially the Rev. James Waterston of the Shetland Islands (Scotland) I am sure that there are three or four obviously distinct species in this group of characteristic albatross and Procellariiform parasites. In the present collection one of these other species is present, and I describe it herewith. In this connection I wish to note that the species of *Eurymetopus* recorded by me in New Mallophaga I, pp. 135-137, 1896, as taken from specimens of the short-tailed albatross, *Diomedea albatrus*, and the Pacific fulmar, *Fulmarus glacialis* (all bird specimens from the Bay of Monterey, California) and ascribed with some doubt to *Eurymetopus taurus* Nitzsch (I pointed out differences in size and other details at that time) are undoubtedly not *taurus*, but are of an undescribed species which I now propose to call *pacificus*. In New Mallophaga I, I figured (Pl. XI, figs. 3, 4, 5 and 6) an adult female, a very young female, an immature but fully grown male, and the head of an adult male. These figures, together with my measurements showing the characteristic smaller size of the new species, and my reference to the signature, together with the host references and the remark which I may at present add, that the terminal segments of both male and female differ conspicuously (as shown in my figures) from the conditions in *taurus*, may sufficiently diagnose the new species, *E. pacificus*, for the moment. I shall take early opportunity to publish a full description.

One male and several females of the well marked new species of *Eurymetopus* which I describe herewith were taken by Mr. Murphy from *Piomedea melanophrys* (South Atlantic; R. C. M., 1406) *Ossifraga gigantea* (South Atlantic; R. C. M., 1383), and *Thalassogeron chlororhynchus* (South Atlantic; R. C. M., 1405). The differences by which it can readily be distinguished from *E. taurus*, are its smaller size (but larger than *E. pacificus*), its different proportions as regards length and breadth of whole body and the various parts, head, thorax and abdomen, the new species being everywhere more slender, that is, less broad in proportion to its length, its narrow, longer signature, and the less pronounced modification of the antennæ of its male. However, this modification (i. e. the difference between the female and male antennæ) is well marked enough to be immediately noticeable. Rev. James Waterston of the Shetland Ids., informs me that he has specimens of a *Eurymetopus* in which the antennæ of the male are wholly "simple," i. e. without any sign of appendage on, or expansion of unusual extension of any of the segments beyond what is shown in the female. From my rather large collection of *Eurymetopus* material, representing specimens from various albatrosses, petrels and allied birds from various oceans, I can pick out at first inspection, examples of at least three species, namely *E. taurus* N. (type species of the genus) coming from Atlantic and Indian Ocean albatrosses, *E. pacificus* Kellogg, from Pacific and Arctic albatrosses, and *E. murphyi* Kellogg, from South Atlantic hosts.

Female, length 3.9 mm.; width 1.07 mm.; head, length 1.21 mm., width 1.18; narrow-bodied form, with the secondary sex differences of the male antennæ much less pronounced than in *E. taurus* and also less than in *E. pacificus*, but still very obvious.

Head not quite as wide as long (the head is one fifth wider than long in *taurus*, and very slightly wider than long in *pacificus*) with signature longer than wide, being of elongate shield shape instead of broad and short shield shape as in *taurus*; the clear area all around the signature is very well distinguished and wider than in *taurus*; antennæ simple (i. e. no unusual extension of 2nd segment and angulation of 3rd segment as in *taurus*.)

Pro- and meta-thorax together longer than broad (the meta-thorax in *taurus* is as broad as the length of pro- and meta-thorax taken together); middle of posterior margin of metathorax strongly angulated on the abdomen, and only slight indication of backward projecting

points from the lateral angles (in *taurus* these are distinct and the posterior margin of the metathorax is only flatly angulated on the abdomen, being indeed nearly straight).

Abdomen slenderer than in *taurus*, and with the lateral transverse blotches more widely separated on the middle of the dorsum of segments three to six than in *taurus*, where they nearly meet on all the segments; ventral genital blotch not so wide as in *taurus*, this arriving not merely from the greater slenderness of the abdomen, but also from the fact that the blotch does not reach laterally so near the edge of the segments involved as in *taurus*.

Male, length 3.12 mm.; width 1.3 mm.; head, length .94 mm., width .94 mm.; the antennæ with 2nd segment much longer than in female, being longer than 3rd, 4th and 5th together, but the antennal differences are markedly less than in *taurus*.

LEMOBOTHRUM GIGANTEUM Nitzsch

An adult male and young from *Neophron percnopterus* (Cape Verde Ids.; R. C. M., 1203).

COLPOCEPHALUM SUBSEQUALE Nitzsch

Several males from *Corvus (corone?)* (Cape Verde Ids.; R. C. M., 1264).

ANCISTRONA GIGAS Piaget.

Males and females from *Daption capensis* (South Atlantic; R. C. M., 1414), *Æstreclata mollis* (South Atlantic; R. C. M., 1396) and *Æstreclata incerta* (South Atlantic; R. C. M., 1390). *Daption capensis* is the host from which Westwood described (in 1874) the type, and only other species (*procellariæ* Westwood) referred to this genus. The measurements recorded by him are so much smaller than those shown by the single female specimen of the genus that Piaget later had from a *Procellaria glacialis*, and Westwood's description was otherwise so brief, that Piaget was constrained to establish a new species for his specimen. Now, however, that I have taken *gigas* (my specimens are fully as large as Piaget's type) from the original host of *procellariæ*, I think it very likely that the two species are but one. If so, Westwood's name has priority.

MENOPON MESOLEUCUM Nitzsch.

One male from *Corvus (corone?)* (Cape Verde Ids.; R. C. M., 1264).

COLLEMBOLA, SIPHONAPTERA, DIPTERA AND COLEOPTERA OF THE SOUTH GEORGIA EXPEDITION.

BY CHARLES SCHAEFFER,

BROOKLYN, N. Y.

Order COLLEMBOLA

Family ENTOMOBRYIDÆ.

ISOTOMA GEORGIANA Schäffer.

Isotoma georgiana Schaff., Die Collembolen von Süd Georgien, Jahrbuch d. Hamb. wissenschaftl. Anst. 1891, p. 197.

Isotoma georgiana Schaff., Apterygoten d. Hamb. Magalh. Sommerreise, 1907, p. 10, Taf. 1, Fig. 33.

Isotoma georgiana Wahlgren, Wissensch. Ergebnisse d. Schwed. Südpolar Expedition, Bd. V, 1900, p. 12, Taf. 2, Fig. 30.

Isotoma georgiana Enderlein, Deutsche Südpol. Exp. Bd. X, Zool. II, 1909, p. 500.

Isotoma georgiana Enderlein, Die Insekten d. Amareto Archipalata Gebietes, Kungl. Sv. Vet. Akademiens Handlingar, Band XLVIII, 1912, p. 139.

Numerous specimens of this species were found January 7th.

This species was described by Schäffer from South Georgia but recorded by Wahlgren also from Tierra del Fuego.

Order SIPHONAPTERA.

Family PULICIDÆ.

NOTIOPSYLLA KERQUELENSIS Taschenberg.

Pulex kerquelenensis Tasch., Die Flohe, Halle 1886, p. 67 and 122 tab. II fig. 12.

Pulex kerquelenensis Baker, Canad. Ent. vol. XXVII, p. 198.

Pulex kerquelenensis Baker, Proc. U. S. Nat. Mus. vol. XXVII, p. 137, 157.

Gonopsyllus kerquelenensis Baker, Proc. U. S. Nat. Museum vol. XXIX, p. 128, 140.

Gonopsyllus kerquelenensis Enderlein, Deutsche Südpolar Exped. vol. X, Zool. 2, p. 440.

Notiopsylla kerquelenensis Jord. and Rothschild, Novitates Zoologicae vol. XXI, p. 219.

Two specimens taken from *Prion banksi* and *Larus dominicanus*, sent to Dr. Jordan of Tring, England and identified by him as this species.

They were common on *Prion banksi* and noticed by Mr. Murphy in numbers in the soil of the burrows of the bird. Only one specimen was taken on *Larus dominicanus*.

This species was described and known previously only from the Kerguelen Islands where it was taken on *Pelecanoides urinatrix*.

Order DIPTERA

The few but nevertheless very interesting Diptera collected by Mr. R. C. Murphy on his expedition to South Georgia belong to four species of which three were from the Island of South Georgia and one, *Pseudofiersia spinifera* Leach, from Trinidad Islet. Of the three species from South Georgia two were found to be new.

Family CHIRONOMIDÆ.

ERETMOPTERA MURPHYI sp. nov.

Color almost uniformly yellowish testaceous. Eyes convex, widely separated, not hairy. Ocelli absent. Palpi four-jointed, apparently is in *browni*. Antennæ six-jointed, first joint short and stout, second joint longer than third, but not as long as the third and fourth joint combined, the fifth a little shorter than third, sixth joint longer than second. Prothorax rather feebly produced in front, from apex to base a longitudinally impressed median line; near apical margin a deep transverse impressed line which is interrupted at middle; laterally, at about apical third, strongly constricted. Wings whitish, short, strap-like, reaching to the fourth segment of abdomen, veinless. Halteres very small, knob-like. Abdomen with nine segments, which are feebly narrowing towards apex, very sparsely covered with fine short hairs. External genitalia inconspicuous, not visible. Legs long; tarsal claws simple; pulvilli absent; empodium long, curved, on the outer side with a row of spine-like hairs. Length 2.5 mm.

Two specimens, both females, collected in alcohol together with specimens of a species of Collembola, *Isotoma georgiana* Schäff., near the Bay of Isles, South Georgia, in January and February, 1913.

Differs from the female of *E. browni* in having six-jointed antennæ, halteres normal, knob-like, and the naked eyes, characters sufficient for the erection of a new genus for this species. However, in the absence of males and the very limited material at hand I prefer to place it provisionally in the genus *Eretmoptera*. The only species of the genus *Halirytus*, *H. amphibius* from Kerguelen Islands, with six-jointed antennæ in the female but with short two-jointed

palpi differs, judging from the description and figure, much more in habitus from *E. murphyi* than does *E. browni*.

Family BORBORIDÆ.

ANTROPS TRUNCIPENNIS Enderlein.

- Antropsycton pinnatus* Enderlein, Zool. Anzeig. XXXIV (1909) p. 228, fig. 1.
Pteronys aratus, Bigot, Miss. Cap. Horn, Zool. Ins. 1888, D. V. (Diptera) p. 43 pl. IV, fig. 7, 7a. (Tierra del Fuego).
Pteronys nivalis Gercke, Jahrb. Hamb. wiss. Anst. vol. VI (1888) p. 153 (South Georgia).
Pteronys nivalis Enderlein, Die Insekten des antarctischen Gebietes. Deutsch. Sudpol. Exped. X., Zoologie II, 1909 p. 394 and 499.
Antrops truncipennis Enderlein, Die Insekten d. Antarktisch-archipelago-Gebietes. Kungl. Sv. Vet. Akademiens Handlingar Band XLIII (1912), pp. 97 and 135.

A single female in alcohol in the same vial with specimens of *Hydromedion sparsutum*.

The wings of the specimen are about as long as the prothorax, a little shorter than described by Enderlein, otherwise the specimen agrees well with his description.

Family DRYOMYZIDÆ.

ACTOCELES GEORGIANA sp. nov.

Antennæ fuscous; face reddish, darker near the oral region; vertex cinereous, with a longitudinal, pale, median vitta, in about apical half covered sparsely with short, recumbent hairs; metathorax cinereous, dorsum with three, more or less distinct, longitudinal darker lines, which do not extend to the basal margin, dorsum covered not very densely with short recumbent hairs, humeral umbone and pleuræ more or less distinctly covered with greyish-white pruinosity notopleural suture reddish; scutellum cinereous, near lateral margins a few short recumbent hairs; abdomen bluish-grey pollinose; wings subhyaline, pale grey, veins black, at base pale; halteres and calyptæ flavate; legs shining, piceous or fulvous.

Male. Sides of face, palpi, femora, tibiae and abdominal segments three to five covered somewhat densely with long dark hairs; anterior and posterior tibiae inside near apex with a patch of dense, golden-yellow hairs; metatarsi of anterior and posterior legs at sides also covered densely with golden-yellow hairs as well as the second and third joints of the posterior tarsi.

Female.—Sides of face with sparse, short hairs; palpi with shorter and less numerous hairs than in the male; abdomen above and beneath very sparsely covered with short recumbent hairs, only the lateral margins of fourth and fifth segment with some longer hairs; apical

margin of abdominal segments, except the first dorsal with a narrow yellowish border; legs much more sparsely clothed with shorter hairs than in the male; anterior and posterior tibiae and tarsi clothed with golden-yellow hairs as in the male but the metatarsi of anterior legs more elongate and narrower than in the male.

Length, male 9 mm., female, 8.5 mm.

No. 1945, Possession Bay, South Georgia, March 12, 1913, about twenty-five specimens found mostly under stones.

Judging from the description and figure this species is closely allied to *Actoceles abscondita* Enderlein¹ from the Falkland Islands. It seems to differ from that species only in darker color and the uniform greyish-hyaline wings, the veins of which are without yellowish-brown border. It is possibly only a race of *A. abscondita*.

These Diptera, according to Mr. Murphy's field notes, were most commonly found under stones on the upper beaches, though he saw them also on sea-weed along the drift line, and crawling over the rotting carcasses of seals. They were always sluggish, and he never saw one fly. Sometimes when a stone was overturned, fifty or more of the Diptera would be found huddled together, and if disturbed they would scatter slowly, and walk deliberately to cover. He never saw them far above sea level, but commonly on the beaches and grass-grown moraines.

Small dipterous maggots were seen on several occasions in the carcasses of birds which had lain dead on the beaches, which probably were the larvæ of this species.

Family HIPPOBOSCIDÆ.

PSEUDOLEERSIA SPINIFERA Leach.

Leersia spinifera Leach, Epich. Ins. 557, pl. XXVI, f. 13.

Cynthomyia canescens Walk., List IV., 1144.

Onchocera spinifera Spencer, Zoolch. f. Hym. n. Dipt. II., 117.

Onchocera spinifera Austen, Ann. and Mag. Nat. Hist. ser. 7, XII, 205.

Two specimens from Trinidad Islet, South Atlantic Ocean, April 8th (No. 1973) and April 9th (No. 1988). The frigate bird taken at Trinidad on which they are very likely parasitic was the small species *Fregata ariel*. The following note on habit and capture is from Mr. Murphy's field notes:

"While fishing near the rocks of Trinidad Islet numbers of

¹ Konig. Sv. Vet. Akademiens Handlingar: Bd. XLVIII, p. 14.

Hippoboscid flies were seen in the boat. They alighted on our oars, gunstocks, hands, etc., and were very quick to dodge and escape capture. They scuttled along as quickly as a sand crab, and when they took flight they alighted again almost instantly. One (No. 1073) was caught.

On the following day, when we were over a hundred miles north of Trinidad a second fly (No. 1988) was caught at the main mast head of the Daisy, and brought down to me."

Order COLEOPTERA

Family TENEBRIONIDÆ.

HYDROMEDION SPARSUTUM Müller.

Hydrops sparsutus Mull., Käfer von Süd-Georgien, Deutsch. Ent. Zeitschrift 1884, p. 418.

Hydro-medon sparsutum Fairmair, Ann. Sci. Ent. France, 1885, p. 53.

Hydro-medon sparsutum Fairmair, Miss. Scient. Cap Horn, 1888, p. 191, 49.

Hydro-medon sparsutum Mjöberg, Arkiv för Zoologi, Bd. III, No. 13, p. 6 (eggs, larvæ and imago).

Hydro-medon sparsutum Kolbe, Hamb. Magall. Sammelreise, Coleoptera, 1907, p. 88.

Hydro-medon sparsutum Enderlein, Deutsche Südpolar Expedition vol. X Zoologie II, 1909, p. 405.

Hydro-medon sparsutum Enderlein, Die Insekten d. Antarkto Archipalata Gebiets, Kungl. Vet. Akademiens Handlingar. Vol. XLVIII, p. 133.

A number of specimens of the imago under stones on February 1st and March 12th and a few specimens of the larva of this species on March 11th.

PERIMYLOPS ANTARCTICUS Müller.

Perimylops antarcticus Mull., Käfer von Süd-Georgien, Deutsche Entomologische Zeitschrift, 1884, p. 416.

Perimylops antarcticus Fairmair, Ann. Sci. Ent. France, 1885, p. 59.

Chorimerium antarcticum Behrens, Stett. Ent. Zeitsch., 1887, p. 21, Fig. 7-11.

Perimylops antarcticus Fairmair, Miss. Scient. Cap Horn, VI, 1888, p. 191, 41.

Perimylops antarcticus Mjöberg, Arkiv för Zoologi, Bd. III, 1909, N. 13, p. 11, figs. 3 and 4, fig. 5.

Perimylops antarcticus Kolbe, Hamb. Magall. Sammelreise, Coleoptera, 1907, p. 88.

Chorimerium antarcticum Kolbe, Hamb. Magall. Sammelreise, Coleoptera, 1907, p. 91.

Perimylops antarcticus Enderlein, Deutsche Südpolar Expedition vol. X, Zoologie II, 1909, p. 407.

Perimylops antarcticus Enderlein, Die Insekten d. Antarkto Archipalata Gebiets, Kungl. Sv. Vet. Akad. Handl. Bd. XLVIII, p. 134.

Three specimens of a heteromorous larva which agree with Mjöberg's description of the larva of this species were taken March 11th together with larvæ of *Hydromedion sparsutum* Mull.

ANATOMICAL NOTES ON THE YOUNG OF
PHALACROCORAX ATRICEPS GEORGIANUS.BY R. W. SHUFELDT, M. D.,
WASHINGTON, D. C.

On March 27, 1914, Mr. Robert Cushman Murphy, of the Brooklyn Museum, kindly presented me with a specimen of the young of *Phalacrocorax atriceps georgianus*, for the purpose of having its anatomical structure examined. This specimen bore the number 1620 in Mr. Murphy's collection, having been taken by him when it was but twenty-four hours old at the Bay of Isles, South Georgia Island, on December 30, 1912. It came to me in gauze, dampened with the preservative in which it had been kept, and it was in excellent condition. Shortly after its reception I photographed the specimen, natural size (Plate I). It was next placed in a bottle containing denatured alcohol, where it remained until May 23d, 1914, when I again examined it.

When first received the specimen was of a deep plumbeous black color, somewhat lighter on the under parts, the feet being of a very pale shade of cream-white.

Below either eye there is a light gray area of about the size of the eye itself, while the lower mandible, all to its subapical, dark anterior part, is of a slate gray, the upper one being almost black. At a distance of two millimeters from the tip of the latter, in the middle line, there is a small, whitish, circular nib, such as is to be observed on the upper mandibles of young fowls and other birds when they are first hatched.

A small, white spot indicates the locality where the uropygial gland opens externally, and posterior to it the acute angular line, with its apex pointing posteriorly, where the future rectrices would have made their appearance. Immediately below this, in the median line, there is to be observed the rather large anal opening, with its prominently elevated border or rim. Its contour is elliptical, with the major axis transversely disposed. Posterior to this opening and at a distance of a centimeter in the middle line, there is to be found the *somatic umbilicus*, which is about half the size of the anal aperture, it having a

similar raised margin of an elliptical outline, the long axis of which is placed longitudinally. Both of the side views of these openings may be seen in Figure 1 of Plate I.

Perfect little "nails" have already formed on the ungual phalanges of the feet, and the webs between the toes are entire, being carried to the bases of the nails all round.

No feathers of any description appear anywhere on the body or limbs, while the latter, owing to the non-ossification of the skeleton, are soft and flexible.

There is a very slight evidence of a *gular pouch*, and the position of the hyoidean apparatus is distinctly visible through the skin. Either *eye* is small and closed.

The external *nares* *apertures* are very minute, and over the locality of the auditory organ, on either side, I fail to find any opening in the dermal structures to indicate the position of the external auditory meatus. On either side of the cranium its location is merely indicated by a very shallow concavity, with no opening at its base, in so far as could be discovered by the use of a powerful lens.

About a month after this specimen had been in the denatured alcohol, all the ventral parts became very much lighter in color, especially the gular area and an elliptical space surrounding the somatic umbilicus. This last area was carried forward as a sharp, acute point to the anterior limitation of the abdominal cavity, when its median apex was from that point extended forwards to the root of the neck, in the middle line, as a dark, longitudinal stripe of no great width. These peculiar and very striking markings were all in the dermal tissues, and I am unable to give the reason for their appearance there.

The skin of this young cormorant is particularly tough and leathery, especially on the dorsal region of the trunk.

As almost any external measurement may be accurately obtained from Fig. 1 of Plate I, I have not thought it necessary to present any such data.

Upon opening the mouth, the buccal structures brought into view are of a very simple order. Among the most interesting of these is the *tongue*, all the parts of which (that subsequently ossify) are in elementary cartilage—that is, the various elements of the "hyoidean apparatus" are thus far but preformed in that material.

The *glosso-hyal* has a length of 0.35, and is bifid posteriorly, while its entire length rests upon an elevation of the floor of the mouth which rises up in front of it, apparently for that purpose. It is covered by the common buccal mucous membrane.

When the delicate skin of the head has been entirely removed, it will be observed that the eyes are very large and bulging. Superiorly, in the frontal region, they are separated from each other by an interval of 0.55 mm., and either one has a mean diameter of 0.12 mm. Either *aural aperture* is exceedingly minute, and after employing every means at my command to find its external opening, I failed to discover any; the *meatus*, at this stage of development in *Phalacrocorax a. georgianus* at least, terminates as a blind tube on the inner surface of the skin.

All the bones of the skull are now either in elementary cartilage or in membrane, according to their mode of development. As membrane bones, the *parietals* are thin and transparent, and the large brain-mass can easily be discerned through them. Anteriorly, this part of the cranium mounds up above the frontal region and eye-balls, to be less prominent laterally and posteriorly. A general, though not very deep, cavity marks the frontal region, which terminates at the cranio-facial area at the base of the superior mandible.

After the cephalic integument has been removed, the thin parietal bones (*pa*) shrivel and collapse (as shown in Fig. 2), crowding and distorting the brain-mass as they do so. The superior cervical muscles (*n*) are very strong even at this early stage of development, and immediately anterior to them, on either side, is seen the *jugular vein*, which here, as usual in birds, is a single trunk. On the right side this vein is larger than that of the left.

As shown in Fig. 2, several lateral branches join the jugular on the side of the neck; these come from the skin, the muscles and the œsophagus.

Between the base of the cranium and the *os furcula*, the neck forms a double curve like the letter S, the convexity of the superior moiety being posteriorly-directed, while the lower half presents the reversed curvature superiorly; the *trachea*

and the *oesophagus* are in front of the neck, the large *oesophagus* being between the two and the trachea in advance of it. These two tubes are in the middle line for a short distance below the hyoidean apparatus, but they gradually pass to the right side of the neck as they descend, and only become submedian again as they, side by side, enter the chest between the clavicular limbs. At this stage, *all the rings of the trachea* are in elementary cartilage, and the exposed part of the tube is cylindrical in form between its extremities.

Many of the *superficial muscles* of the head, neck and trunk are visible and easily made out. Attention is invited to two or three of the most prominent ones in Fig. 2, as the *gluteus primus* (*gp*); the *levator caudæ* (*lc*); the *peroneus longus* (*pl*), and the *obliquus externus abdominis* (*o. e. a*).

On the side of the body, immediately anterior to the knee and in contact with its superficial structures, there is quite a sizeable mass of *adipose tissue*; it is of an irregular form, transversely compressed, and rests, in either case, on the side of the chest.

The rudimentary retrices, which at this stage appear as fine little white spiculæ, are twelve (12) in number; the six of the right side are well seen in Fig. 2.

Very little osseous material has as yet developed in the bones of either the pectoral or the pelvic limbs, and these structures are in a very elementary condition.

The *hyoidean apparatus* is entirely in cartilage, in so far as its skeletal parts are concerned, and the same may be said of the cordate-shaped *superior larynx*, which lies between its backward-extending limbs. The *rima glottidis* has a length of two millimeters, or somewhat longer than that of the common opening of the *Eustachian tubes*, which is to be seen at its usual site in the *Phalacrocoracidae* at the basis cranii.

Nine millimeters in front of the Eustachian aperture and in the median line, is to be observed the *posterior nares*, another longitudinal slit-like opening of a size about equal to the first-named one.

Even at this very early stage of growth of the individual, the *sclerotal platelets* of the eye are easily to be made out, and

may be counted without great difficulty; where they lap over each other, a white area is produced equal, in any case, to the double parts.

Passing for the moment to the *pelvic limb*, and removing the muscles, tendons and ligaments surrounding the knee-joint. I find that in addition to the usual epiphysial cartilages forming the distal end of the femur and the proximal extremity of the tibio-tarsus, there is a separate ossific centre for the *patella* as well as for the cnemial process of the tibial shaft. This specimen, however, is at too early a stage of development to definitely ascertain what the future course of ossification will effect in the bones in question. Nevertheless, as far as matters have proceeded, the state of the parts sustain a demonstration of mine, which has been published in another place.¹

Upon removing the thin musculo-membranous layer covering the lower abdominal viscera, there is brought into view (Fig. 4) the right and left lobes of the liver, the former in this situation being considerably the larger of the two and extends further posteriorly. The *stomach* is very large and fills a good part of the abdominal cavity. Anteriorly, the two lobes of the liver underlap it. The bilobed *pancreas* (*p*) is situated to the left side of the abdominal cavity and opens into the duodenum by a single duct.

At this stage, the *sternum* and the several bones composing the pectoral arch or "shoulder girdle" are performed entirely in cartilage. All their usual articulations are complete, however, and they are simply awaiting the matters of growth and development.

The keel of the *sternum* is extremely rudimentary; the body of this bone does not appear to exhibit its several centers of ossification, and probably for the reason that the latter process has not, at this early stage, commenced yet. In their morphology, these elementary bones foreshadow, to some degree, the forms they eventually possess in the adult bird.

The greatest median, longitudinal length of the heart equals 12 mm., while its greatest transverse diameter, taken just below the auricles, equals 9 mm. In the present specimen, both the auricles, as well as the vessels leading into and from them,

¹SEEFELD, R. W. "On the Patella in the *Phalaropus lobatus*." Proc. Zool. Soc. Lond., 1913, (Sept., 1913), pp. 162-163. Pl. I, XI, Figs. 1-6.

are of a deep, purplish black color, while the ventricals and ventricular vessels are of a very pale shade. This difference, owing to the former being filled with clotted blood, is probably due to the manner in which the specimen met its death.

The heart of this young shag presents nothing of a very peculiar character over the young of other steganopodine birds, in so far as its general characters are concerned.

As will be observed from Fig. 5, Plate II, the lower bifurcation of the *trachea* and the *bronchi* are of very simple construction. The large terminal trachial half-wing meets neither anteriorly nor posteriorly, the interval being more marked behind than it is in front, and this ring is prominently raised and individualized all round. A *pessulus* has already formed. As a whole, the tracheal tube is of a nearly uniform caliber between the superior larynx and syrinx.

At this age, the lungs fill but a very small space in the chest-cavity and are overlaid by a firm pleura.

There is a rudimentary *diaphragm* present, being in contact on its posterior surface with the two lobes of the liver and the large stomach.

As is frequently the case in birds, the *right lobe of the liver* is more than double the size of the left lobe, while in the case of either of them the posterior margins are sharp and the anterior ones rounded. The left lobe is concave on its dorsal aspect and convex ventrally. The right lobe also is convex on its ventral surface, but nearly flat dorsally. The two lobes are in contact and slightly overlap in the median line, while the two in front are fashioned to admit of room for the ventricular portion of the heart.

According to Gadow, this proportion of the hepatic lobes is found among the *Steganopodes* generally². There is an elongate, pear-shaped *gall-bladder* present, nearly as long as the right hepatic lobe, between which and the stomach it is found. The *spleen* is of fair size, subcircular in form, being ventrally flat and dorsally convex.

At the rectal extremity of the small intestine, within the anal opening, I find the *bursa* of some considerable size, and it opens into the *cloaca* by a small duct found mesially between

the opening of the ureters.³ This bursa gradually disappears as the bird nears adult life, and its physiology is not fully understood.

Neither the *testifian bodies* nor the *adrenals* present anything peculiar, or beyond what is already known to obtain in the young of the *Phalacrocoracidae*.

The *small intestine* is, from the proventriculus to the anal aperture, of rather small and uniform caliber; it has a total length of 28.5 centimeters. Whether the *intestinal caeca* are present at this age it is difficult to say; I searched for them but without success; if present, they must be very small and probably functionless.

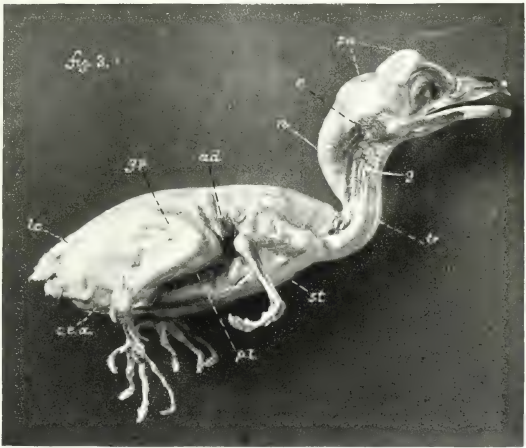
As before stated, the *stomach* is, comparatively speaking, very large, and possesses, as a whole, an ellipsoidal form when filled with food, as in the present instance. The *oesophagus* enters it squarely at the middle, anteriorly—that is, at the fore-end of the long axis of the organ, while the *gut* quits it posteriorly, at a point anterior to its hinder rounded extremity. As to its walls, they are extremely thin; hardly at all muscular, and quite translucent when held up to the light. In the present instance, the organ was filled, almost to the limit of its capacity, by the remains of a slightly digested fish, of about the size of a small sardine. Unfortunately, the skull had all come apart, and was mixed up in such a way that it was impossible to discover what species of fish it was, or whether it was one known to science. The entire and articulated vertebral spine was perfect and extremely delicate in structure. There is no question as to its being a small teleosteon form with thirty-seven vertebræ; slender neural spines, and a tail resembling that of a *Fundulus*.

³Forbes, Wm. Allen Coll. Sci. Papers, p. 11, 1882.

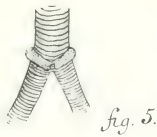
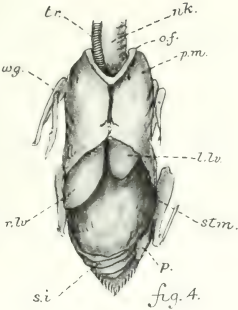
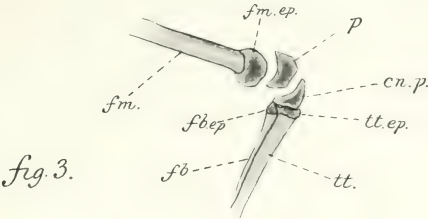
fig. 1.



fig. 2.



THE YOUNG OF *PHALACROCORAX ATRICEPS GEORGIANUS*



THE YOUNG OF *PHALACROCORAX ATRICEPS* GEORGIANUS



Pygoscelis papua, Bay of Isles, Dec. 23, 1912

THE MUSEUM
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SCIENCE BULLETIN

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THE PENGUINS OF SOUTH GEORGIA

BY ROBERT CUSHMAN MURPHY

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Five, possibly six, species of penguins have been recorded from South Georgia, and at least four of these were at one time established residents. The macaroni penguin (*Eudyptes chrysolophus*) and the ringed penguin (*Pygoscelis antarctica*) are now rare. Representatives of the former genus belong typically to a more northerly area* while *Pygoscelis antarctica* is a polar species. It is not unnatural, considering the diminution in the numbers of penguins which has certainly occurred at South Georgia, that the truly *Subantarctic* types should have outlived competitors whose ranges had stretched, on the one hand, southward from a more

*The range of the macaroni penguin extends south to the South Orkneys, where it may possibly even breed. (Cushman, 1914, pp. 10-11.)

temperate life zone, and, on the other, northward from an Antarctic sea. To-day the dominant species at South Georgia is *Pygoscelis papua*, while the splendid king penguin (*Aptenodytes patachonica*), likewise native to the Subantarctic, occupies numerically the place of a poor second.

My field work at South Georgia extended from November, 1912, until March, 1913, thus including the greater part of the penguins' breeding season.* Conditions, however, were not favorable for a sustained and exhaustive study of these fascinating birds. Working entirely alone, with a multiplicity of interests; living for the most part on board the sealing brig *Daisy*, which was anchored miles distant from the penguin rookeries; stormbound for days at a time without hope of being able to get ashore — I should have had enough to contend against without the added factor of human interference. But the ignorance and destructiveness of the *Daisy's* crew were the greatest of all hindrances to successful work. Unrestrained, the sailors and officers periodically raided the penguin settlements, killed large numbers of the adults not only for food, but for the skins as well, and destroyed many more of the eggs than they could either eat or take back to the United States as marketable "curiosities." The most deplorable incident was the wholesale theft of eggs from two colonies of king penguins at the Bay of Isles. Many of these contained large embryos, and such eggs as could be neither eaten nor blown were thrown overboard. As a result of this piece of vandalism, I was denied the privilege of seeing any young king penguins during our entire visit. Moreover, the pitiable remnant of this fine species was doubtless seriously set back in its waning struggle to keep a foothold at South Georgia.

Under such limitations the following observations were made. They are scattered notes, jotted down in the field; linked together they form at best a fragmentary record of the life histories of the king penguin and *Pygoscelis papua*.

Aptenodytes patachonica Forster

Aptenodytes patagienus Cat. B. Brit. Mus., XXVI, p. 627.

The king penguin was formerly an abundant bird at South Georgia, but it is now obviously in danger of extinction. Captain James Cook, the discoverer, found large numbers of the species on the occasions of his

* See "A Report on the South Georgia Expedition," *Science Bulletin of the Brooklyn Institute of Marine and Coastal Science*, Vol. II, No. 1, 1913, p. 1.

several landings in January, 1775, and James Weddell, visiting South Georgia in 1823, wrote the following quaint account, which, in the light of recent discovery, has become classic :

Of the bird tribe, the king penguin is the most worthy of notice. The penguins are of a very gregarious nature. They go in large flocks along the shore, erect, and with a waddling gait. When seen through a hazy atmosphere, they may be not inaptly mistaken for a body of men.

In pride, these birds are perhaps not surpassed even by the peacock, to which in beauty of plumage they are indeed very little inferior,—as may be seen in our principal museums. During the time of moulting, they seem to repel each other with disgust, on account of the ragged state of their coats; but as they arrive at the maximum of splendor they re-assemble, and no one who has not completed his plumage is allowed to enter the community. Their frequently looking down their front and sides in order to contemplate the perfection of their exterior brilliancy, and to remove any speck which might sully it, is truly amusing to an observer.

About the beginning of January they pair, and lay their eggs. During the time of hatching, the male is remarkably assiduous, so that when the hen has occasion to go off to feed and wash, the egg is transported to him, which is done by placing their toes together and rolling it from the one to the other, using their beaks to place it properly. As they have no nest, it is to be remarked, that the egg is carried between the tail and legs, where the female, in particular, has a cavity for the purpose.

The hen keeps charge of her young nearly a twelvemonth, during which time they change and complete their plumage; and in teaching them to swim, the mother has frequently to use some artifice; for when the young one refuses to take the water, she entices it to the side of a rock, and cunningly pushes it in, and this is repeated until it takes the sea of its own accord.

The present great reduction in the numbers of the king penguin has been caused undoubtedly by human depredations, in part by the foraging raids of sealers and whalers, but perhaps in an even larger measure by traders in penguin oil. Regarding this last class, Klutschak, who visited South Georgia on an American sealing schooner in 1877, wrote :

Human greed has been the cause of great persecution of these creatures. I am told (although personally I cannot vouch for it) that oil made from penguin fat was formerly utilized in tanning leather, and that vessels came for the purpose of taking these birds in huge numbers in order to extract the oil. This commodity, which must always have been expensive, has now been superseded by cheaper and perhaps better chemical preparations, hence the destruction of the penguins has ceased. Proof that they were slaughtered in former times, however, may be seen along the whole northern and northeastern coasts where the small iron fry-pots, always arranged in pairs, still lie about. At French Harbor* parts of a French penguin-hunting ship, which was wrecked in this labyrinth of reefs, may still be seen. (Translation).

* About 12 miles west of Cape Butler, not designated on nautical charts.

Since South Georgia has been made a political dependency of the Falklands, the resident birds have come under the protection of law, but perhaps too late for the king penguins because of the impracticability of enforcing legal restraint along hundreds of miles of isolated, uninhabited coast.*

We discovered three king penguin colonies, all in the neighborhood of *Pygoscelis* rookeries, but all on low ground. The smallest colony, comprising only a dozen birds, was on the west shore of Possession Bay; the two others on the south shore of the Bay of Isles, five kilometers apart, with the barrier of Grace Glacier between. The eastern and larger of these was situated 1500 meters south of the bay among a barren waste of morainic stones. A great bank of unmelting névé bounded the settlement on the west, while a violent glacial torrent separated it from the sloping edge of Lucas Glacier on the east. In such a gulch, between walls of snow and ice, swept by southerly gales that descended through a rift in the mountains, a band of about three hundred and fifty king penguins made their home. Four years earlier, according to members of the *Daisy's* crew, the same settlement had contained a far greater number of birds during the breeding season.

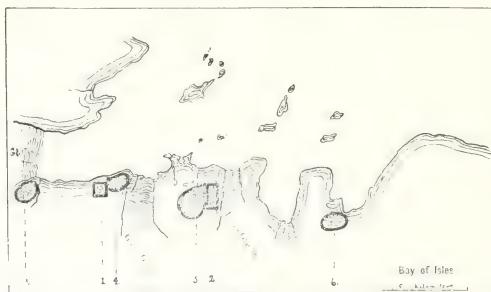
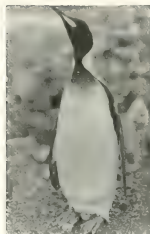


Fig. 1. Penguin colonies at the Bay of Isles, South Georgia. Nos. 1 and 2, *Adelieutes patula hutchinsoni*; Nos. 3, 4, 5, and 6, *Pygoscelis papua*.

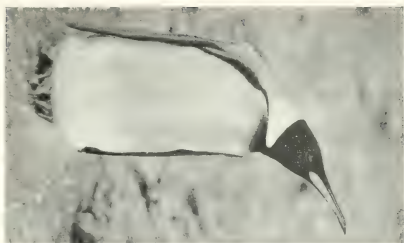
* A 1906, in 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 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1, 2, 3. Three views of the Lucas Glacier colony of king penguins, Dec. 24, 1912. The background is a high bank of névé. The two lower pictures show the free birds massing and beginning to march toward the sea, leaving yearlings, molting adults, and sitters, huddled together in the rear.



1, 2, 3. Incubating king penguins. The upper right hand picture shows a bird which had just been robbed of its egg.



1 and 3. Two views of the same incubating bird
away its egg. Feb. 4, 1913.

Bay of Isles, Dec. 24, 1912

2. King penguin tucking

In this paper I shall refer to the king penguin communities of our acquaintance as the Possession Bay colony, the Grace Glacier colony, and the Lucas Glacier colony, respectively. I failed to find a trace of the colony in Antarctic Bay which is recorded by Lönnberg, and which is known to have existed as late as the year 1905.

With the exception of a single king penguin that came out on the beach of King Edward Cove, Cumberland Bay, on November 26, 1912, no example of the species was seen far from the rookeries.

On December 16 many of the kings at the Grace Glacier colony, (No. 1, of fig. 1), which lay on a slight rise behind the beach, were incubating eggs, while at the same time half a dozen young of the previous year, fully grown but with ragged patches of long down still attached to their contour feathers, were associating with free adult birds.* The sitters stretched up to as great a height as possible at the approach of their first human visitors (at least during that season), and clung tenaciously to their eggs. After the members of our crew had gathered many eggs and had put them in one spot on the ground, the robbed penguins approached the pile and slyly appropriated eggs to replace the lost ones. But not only did they attempt to take one egg—the proper complement—several tried to tuck *two* between their thighs. One bird pathetically attempted to gather up an egg which had been crushed flat when a sailor, tipping its owner forward, had seized it too roughly.

In common with the emperor penguin (*A. forsteri*) the king penguin develops insatiable "sitting" propensities. Repeatedly I saw robbed kings mothering smooth stones in place of eggs, and those which did not have recourse to such cold solace shuffled around on the full extent of the foot for a while after losing their egg, instead of rising at once to the ordinary digitigrade gait. It takes them some hours to become accustomed to an empty egg repository. The egg, as Weddell correctly infers, is carried in the space between belly, tail, and feet. I was never able, however, to discover in either sex anything resembling a "cavity" such as Weddell mentions. The position of the sitting king penguin is satisfactorily described by the accompanying photographs—squatty, with inturned toes, depressed tail, and a broad transverse fold of skin covering the front of the egg which is raised above the ground and rests upon the bird's metatarsi.

* I was not able, either at this time or later, to confirm Weddell's observation that molting king penguins are repelled by the others, although both molters and sitters are given to congregating principally with their own kind.

Incubating king penguins can shift about slowly, in spite of the eggs on their insteps. They drag themselves along rather painfully, maintaining their hunched positions, and hitching their feet with short steps so that the egg may not roll out. They are fond of crowding together closely, yet seemingly for no better purpose than to facilitate quarreling! Day after day at the Lucas Glacier colony I was a neutral witness to their noisy squabbles. The sitters glare at each other, with sinuous necks twisted and heads cocked sidewise, and deal resounding whacks with their flippers, or lunges with their sharp bills, to all their neighbors. Often whole groups will be engaged in an indiscriminate skirmish with these rapiers and broadswords. The birds are careful to maintain their equilibrium while banging each other, but it is a wonder, nevertheless, that no harm comes to the eggs. On February 5 I photographed a typical battle. One sitter was employing its bill to mutilate the back of another's neck. The latter bird, grunting vehemently, was delivering backhand blows with one wing but without turning to face its opponent. Only the intrusion of weapons of other pugnacious penguins succeeded in diverting the attentions of these two from one another. The affair ended in a general *mélée* in which nine birds took part, each for itself and against every other. Such is the reach and flexibility of the king's extensible neck that each sitter can very easily become the center of a large circle of trouble. And yet they *like* to sit as near together as possible, and if they move, it is only to draw to still closer quarters!

According to an officer of a sealing vessel at South Georgia, the mated king penguins relieve each other in the duties of incubation with more frequency than the nesting *Pygoscelis* penguins. I was informed that a bird which has been marked with a cord round the leg was observed to alternate with its mate during the forenoon of each day. The period of incubation is said to be seven weeks.*

King penguins of the Lucas Glacier colony which had been robbed of their eggs not later than December 22, had begun to lay a second time by January 8. On January 16 three females brought to the ship by sailors had within their oviducts eggs almost ready for laying, while a fourth bird had been killed in the very act of depositing its egg. On January 27 I skinned several which contained well-formed yolks not yet detached from the ovaries. Weddell names the beginning of January as the time of mating and laying. We, however, found eggs in an advanced state of incubation in mid-December, while, on the other hand,



1. Group of sitters at the Lucas Glacier colony, Feb. 4, 1913



2. Birds of the same group quarreling, and striking with their wings. The pointed end of the egg shows between the toes of the bird at the left.



A battle in progress. The camera failed to stop sharply the rapid flippers of the bird in the foreground. The bird on the right is watching, ready to use its bill when opportunity offers. All three penguins are covering eggs.



2. Courting pair, Feb. 1, 1913. The picture illustrates a king penguin's ability to "telescope" its neck.

freshly laid eggs have been collected at South Georgia as late as March 10. It seems probable, as has been suggested by Lönnberg, that the breeding season extends through the major part of the southern summer, with great individual variation in the time of laying. I saw a few birds still engaged in pairing about the end of January. Courting couples stroll apart from the main flocks, and seem fond of standing side by side on high places such as knolls overlooking the sea. Caresses are then exchanged, the usual form being for the birds to cross their necks, swaying from side to side, and then for the cock to press slowly downward on his mate's nape until her head is bent quite to the ground.

For the reason given in the introduction I have no data regarding the appearance or life history of the king penguin during the natal down stage. Three chicks in juvenal down* several months of age, labelled "Bay of Isles, June 4, 1914", have been sent me from South Georgia. The smallest of these is 50 cm. in length. Its bill, to which the egg-tooth still adheres, measures only 49 mm. from the gape. The other two youngsters are each about 66 cm. long, with bills of 63 and 64 mm., well-developed rectrices, and much longer down (about 35 mm. max.) than the smaller bird possesses. The down in all three specimens is of a nearly uniform dusky or smoky drab color all over the body. In the case of the youngest bird it is very thin and short over a masklike area on the face. Traces of light-colored natal down still cling to the tips of the dark feathers on the occiput.

Yearling specimens of my own collecting show that the juvenal down grows to a length of 90 mm. or more, fading greatly and turning a streaky golden brown or yellowish with age.† It always remains shortest on the head, becoming hairlike and matted elsewhere on the body before the postjuvenal molt.

This yearling change of coat is well illustrated by five specimens which represent as many stages of the molt. The down on the flippers is the first to go; it is then lost from the belly, next from the back, and lastly from the upper breast, throat, and head. Fragments of it cling longest on the nape of the neck. For the most part the whole coat comes off in the form of tangled mats which resemble wool or hair. The sprouting plumage fails for a few days thoroughly to cover the skin of the head and gular region which is hidden only gradually by a dense

* Terminology of Dwight (1907, Vol. I, p. 164; No. Vol. XIII, p. 100).

† Von den Steinen mentions blonde examples seen by him.

growth of black feathers. The new feathers of the upper breast reveal a pale yellowish tinge. The auricular patches are yellow, slightly brighter than the breast, but with no suggestion of the brilliant orange hue of the mature plumage. The characteristic, subtle, greenish-yellow gloss or "bloom," however, makes its appearance on the crown of the head soon after the down has entirely disappeared. The young king penguin is then a less glorified replica of its parents, with a weaker, wholly blackish bill.*

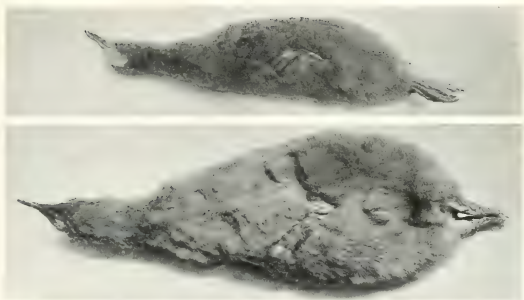
We observed molting adult king penguins throughout our stay at South Georgia, so that the season of this function, like that of laying, would appear to permit of great individual latitude. Discarding the old plumage seems to resemble the same process among the *Pygoscelis* penguins, described elsewhere in this paper. Following the molt of the king penguin's feathers, the horny, orange shields on the mandible flake off, exposing fresh surfaces beneath. On the basis of a single observation I venture the assertion that these birds first shed their mandibular shields at the end of their second summer, possibly just before they migrate to sea. At any rate I saw on February 25, 1913, at Possession Bay, a yearling which had cast the black lateral plates of its rami, the newly exposed surfaces being pure white.

Apparent vanity and aloofness are two marked traits of the king penguins. They dwell within a stone's throw of *Pygoscelis* penguins, play in the same glacial streams and ponds as the latter, and follow the same vocation of deep-sea fishers, yet the society of the two species is almost inviolably distinct. In only one instance did I find a king penguin associating with its smaller relatives. This was on February 28, near the Possession Bay colony, when one king was seen trotting along shore in company with a flock of johnnies (*P. papua*). The sight was so unusual that experienced sealers from the *Daisy's* crew had never seen the like. They laughed at the lone king, and inferred that it must have been a pariah among its kind. King penguins commonly deport themselves in an amusingly lofty manner toward human beings, paying slight attention to a man's quiet intrusion into their midst. If they are annoyed, they march away, slowly and with an air of indifference, until they have been actually frightened by abuse, when they fall upon their breasts and scurry on all fours. I have seen a fox terrier put a whole band of kings to

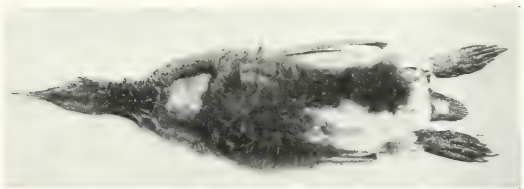
*Judging from our knowledge of the growth of the emperor penguin (*A. adeliae*) the king penguin should be about eight months old at the completion of the molt.



Yearling king penguin of the Lucas Glacier colony, Dec. 24, 1912.



1. Two young king penguins collected at the Bay of Isles, June 4, 1914, (mid-winter).



2. Yearling male in the molt. Bay of Isles, Dec. 24, 1912. The plumage feathers are fairly well-grown on belly and back, but are hardly through the skin on the bare breast spot.



1. Molting king penguins, Dec. 24, 1912. The central figure is a yearling losing its down. The others are adults in various stages of the annual molt. Cast-off feathers strew the snowbank in the background.



2. Stages of the molt. At the extreme right is a fluffy bird in worn plumage, just beginning to lose its feathers. The central bird has nearly completed the process, while the two sleek birds at the left are in new clothes. Bay of Isles, Dec. 24, 1912.

ignominious flight. Sitting birds alone are stolid and fearless, refusing to be stampeded even after their eggs have been taken.

Between the Grace Glacier colony and the sea there was a snowbank about twenty meters broad, down which I saw king penguins coasting, otterlike, during December and January.

The voice of an adult king penguin is a martial sound, a long drawn bugle call, highly musical and almost worthy of being known as a tune. When delivering the call, the bird stretches grandly to its full height, points its bill skyward, and the long volley rings forth from an expanded chest. At the close of the effort the head is tilted forward with a jerk and the bugler stands at attention—a rigid, constrained pose always held for several moments. The yearling penguin's call is a clear whistle of three notes, as soft and sweet as the whistle of an oscine bird.

The actions of "bachelor troops," *i. e.* birds of both sexes which are neither molting nor incubating, always furnish entertainment to an observer. Such bands frequently come out of the sea during the warmer parts of the day to sun themselves on the beaches. The birds sleep either prone or upright; if in the latter position, often with the bill turned behind the wing, where ages ago the ancestors of penguins may have had warm coverts. They preen themselves scrupulously and even perform the difficult stunt of balancing on one foot while they scratch their heads with the other. Their "regimental" characteristics, such as standing at attention, marking time, and marching in single file or in doubles, are very striking. They frequently shake their wings rapidly while they walk or stand. Contrary to a statement repeatedly affirmed of penguins in general, the king penguin's wing is not a mere flipper, immobile except from the shoulder; on the other hand, it is capable of considerable flexure at both joints, and can readily be doubled into a z-shape, a fact which several of my photographs demonstrate.

Cuttlefish beaks were the only edible substances found within the king penguins' stomachs. All of the birds collected were very fat, the layer under the skin sometimes being two centimeters thick.



Fig. 2 a. King penguin trumpeting. b. Posing after trumpeting.

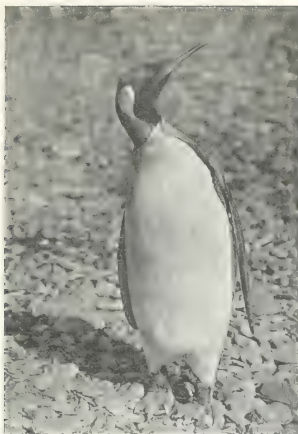
As regards enemies, I judge that this species is little troubled by the skua (*Catharacta*), the scourge of the *Pygoscelis* rookeries. Its enemy in the ocean is the sea leopard (*Hydrurga leptonyx*). From the stomach of one of these seals killed at the Bay of Isles, early in the morning of January 14, 1913, I took the remains of four king penguins, besides fish and other material. The magnitude of this breakfast may be more fully appreciated if I record that the weight of mature king penguins from the Lucas Glacier colony averaged 20 kilograms.

Measurements in millimeters of 20 king penguins collected at South Georgia, are as follows:

Adults	Sex	Date 1912-13	Bill from gape	Bill from nasal feathers	Wing from axilla	Tail	Foot, heel to tip of middle claw
R. C. M. 1553		Dec. 24	124	69	336	51	175
1555	breeding	Dec. 24	132	75	335	52	175
1757	breeding	Jan. 26	131	75	323	72	174
1758 ♂ breeding		Jan. 26	136	75	326	68	180
1760	breeding	Jan. 26	123	73	339	63	173
1818		Jan. 26	131	78	341	72	180
1801		Feb. 1	127	74	325	51	179
1579		Dec. 24	130	76	320	78	157
1580		Dec. 24	125	76	320	55	172
1584		Dec. 24	119	69	332	53	168
1759	breeding	Jan. 26	130	77	330	79	171
1761 ♀ breeding		Jan. 26	127	77	324	70	162
1762 ♀ breeding		Jan. 26	125	74	320	70	172
1816		Jan. 26	122	71	326	45	166
1817		Jan. 26	125	69	325	61	172
Yearlings							
1576		Dec. 24	110	33		59	179
1577		"	110	35		66	161
1578		"	112	30		71	171
1581		"	108	31		83	162
1582		"	115	31		70	165

The length of an adult in the flesh, from tip of bill to tip of tail, was 97 centimeters; to tip of longest toe, with legs outstretched, 114 cm.

The sides of the mandible are yellow, deepening into orange and then into coral red toward the center of the mandibular shield. Reported



1. Adult king penguin, showing the auricular patch, which is indistinct in most of the photographs owing to lack of orthochromatic quality in the plates used. Cumberland Bay, Nov. 30, 1912.



2. A frightened bird "tobogganing."



1. "Bachelor" kings aroused from a noon-day nap, Bay of Isles, Feb. 16, 1913. Lucas Glacier in the background.



2. The same band marching toward the bay.



1 King penguin entering the Bay of Isles.



2 Taking to the water. Three birds show in the photograph, the one in the background being in the act of plunging below the surface.



Coming ashore after long submergence. Bay of Isles, Feb. 16, 1913. The limits of the orange area on the breast show distinctly in this photograph.

sexual difference in the color of the shield is not borne out by my observations, nor by my specimens, in which the bills of mature females are quite as richly colored as those of males. In one adult male, No. 1801, Feb. 1, 1913, the shields are flaking off.

The color of the reticulated iris is raw umber. The pupil is *square* when contracted; when dilated it takes a polygonal shape, like an "iris" diaphragm of a photographic lens. In life, the prominent nictitating membrane is frequently drawn over the eye.

The auricular-patches of mature birds are cadmium yellow; at the front of the neck, where the branches are confluent, the color becomes orange. The posterior edge of the patch, where it joins the bluish tone of the hind neck, is distinctly green, the blending of the yellow and blue producing a solid color on the individual feathers. The concealed portions of the yellow feathers of the ear-patches are white; those of the feathers on back and breast, grayish. The feather-shafts are characteristically flattened and curved, with a width as great as 2 mm. Because of their external convexity they exert a spring-force against the body and function as shingles over the downy aftershafts. The feathers are placed equidistant from one another, forming regular, transverse and diagonal rows over the whole skin. One, or more often two, filoplumes spring from about the base of each feather. The aftershafts are single, but in the form of complex tufts. They are attached at the base of the inner surface of the flattened quills, by which they are matted snugly against the body.

The large eggs of the king penguin are subpyriform, and of a pale olive-green color. An egg taken from the oviduct of a dead bird is pure white. Soon after being deposited, however, the eggs become so plastered with mud that the original color of the shell is indistinguishable. Measurements in millimeters of six specimens are: 108 x 77, 108 x 74, 108 x 75, 108 x 76, 101 x 71, 107 x 75.

Pygoscelis papua (Forster).

Pygoscelis papua (Forster). Brit. Mus., XXVI, p. 13.

This species, the "gentoo" of the Falkland Islands, is known to English-speaking seafarers as the "johnny" penguin. We saw the first examples on the southward voyage in latitude 43° 18' S., longitude 41° 10' W., on November 15, 1912. Cold westerly winds had raised a heavy swell on this day, and just before nightfall penguins began to pass

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Pygoscelis papua (Forster).

Pygoscelis papua Cat. B. Brit. Mus., XXVI, p. 631.

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the ship in couples or small groups, all swimming in a northerly direction. They remained below the water most of the time, but their braying calls frequently attracted attention to sleek heads and upright tails, the only visible parts of birds at the surface. From time to time a few more were seen before we entered Cumberland Bay, South Georgia, on November 24.

During our stay at South Georgia I visited seven populous rookeries of the johnny penguins, besides a number of incipient or decadent settlements which consisted of only a few nests. The situations chosen for the rookeries were so diverse that several of them are worth contrasting.

Two rookeries near the Nordenskjöld Glacier, Cumberland Bay, lay in wet, hummocky meadows, barely higher than sea level and crossed by several streams.

A rookery on the west shore of Possession Bay occupied a dell of less than an acre in area, hemmed in by the talus of bold hills which rose to an altitude of 450 meters on three sides. This rookery was filled with a luxuriant growth of tussock grass (*Poa flabellata*), and the ground was well drained.

The largest rookery that we discovered, comprising between four and five thousand birds, was distributed over knolls and ridges behind a great moraine-beach at the Bay of Isles. The site is bounded by two glaciers so that it can be reached only from the bay. In 1912-13 the penguin settlements, beginning on low ground a kilometer from the waterfront, extended inland and up the hills to a height of about two hundred meters. As long as young penguins were on this nesting ground, processions of adults might at all times be seen coming and going between the high land and the sea. The birds met and passed each other without a visible sign of recognition, each trundling gravely along on its own business. A broad thoroughfare had been stamped across the moraine, worn down doubtless through generations of the pattering of little leathery feet, and deeply grooved, sinuous avenues extended up the long snowbanks to the highest portions of the colony two kilometers from the shore.

The type of rookery last described is common at South Georgia wherever high land is at all accessible. No matter how much available territory there may be near the water, no matter how wearisome the scramble up the hillsides, a certain proportion of the members of each



1, 2 Jolnix penguins sunning themselves on the beach of Cumberland Pay, Nov. 25, 1912.



3 Walking up to the camera. Bay of Isles, Dec. 23, 1912.

colony usually selects the summits of the windy, shelterless ridges for its home. Why should marine birds which lack altogether the power of flight, and which are at best indifferent walkers, prefer to make the period of propagation difficult for themselves by retreating as far as possible from their only source of food? The question has already been raised by Levick (1914) with reference to the great colony of *Pygoscelis adeliae* at Cape Adare, where many of the breeders climb to the bare crest of the cape and make their nests three hundred meters above sea level.* In the case of neither *P. papua* at South Georgia nor *P. adeliae* at Cape Adare can the factor of self-protection offer a satisfying explanation, for both species have only a single terrestrial enemy, the skua, to the ravages of which they are as susceptible on the highlands as on the shore. Dr. Levick does not explain the fact, merely saying that it is "the result of their love of climbing." A consideration of the history of South Georgia, however, may help in an interpretation of the strange instinct which drives penguins of the genera *Pygoscelis* and *Endyptes* to nest among the hills.

Although South Georgia is little larger than Long Island, N. Y., its glaciers are as mighty as those of Spitzbergen, and there is ample evidence that the island was formerly completely buried by an ice-cap. The interior, which rises to an altitude of more than two thousand meters, is no longer ice-clad, excepting on the peaks, but is covered with an everlasting névé of the Alpine type. This consolidates at the sources of all the valleys to form tongues of ice, most of which extend clear into the sea, ending in abrupt walls. Since most of the fiords have been carved out by former extensions of the valley glaciers, the coast is almost beachless, the few areas of low, flat land being terminal moraines or beds of moribund or extinct glaciers. Even now, with the fluctuating seasons, the glaciers sometimes advance their fronts and flanks over considerable ground once abandoned.† It is probable, however, that glaciation is on the wane and that an appreciable decline has taken place even since the visit of James Cook in 1775. Certainly Captain Cook's detailed account of unmelting ice and the absence of fresh-water streams in midsummer does not accord with present conditions.

From the foregoing data it may be assumed that during a long period

* The same trait is equally well illustrated at Macquarie Island by several more species of crested penguins (*Leucostictus*), a preliminary record of which has been in Manuscript (*Leucostictus* *Leucostictus*).

† Murphy, R. C. *Penguins of the World*. G. B. V. L. (1914). Macquarie Island.

following the last complete glaciation, very little territory suitable for breeding purposes was exposed. Whatever bare earth existed must have been found along the ridges which separated the ice-filled valleys. During such a period, before the parent stem of the *Pygoscelis* group had been differentiated into several species, these small penguins may have developed the trait which still leads them to seek lofty places for their nests. The fact that South Georgia was formerly the home of a far more abundant fauna than at present would have tended to fix the "mountain-eering" instinct, for animals obtaining their sustenance only in the sea would have a tendency to increase more rapidly than the proportionate area of the beaches, and through sheer overflow of population many birds would be forced to content themselves with the less accessible ground, leaving the shores to great herds of summering seals,* and the adjacent nesting-sites to powerful rivals such as the *Aptenodytes* penguins. Then there is the factor of floods, whether caused by excessive thaws or by exceptional tides impelled by storms. At the Bay of Isles I found not only masses of kelp but also the heavy skull of a killer whale (*Orca*) far back on the great moraine-beach where it seemed almost incredible that the sea could have carried them. Because of the elevation of their nests the *Pygoscelis* penguins are more secure against floods than the *Aptenodytes*. Possibly this accounts in part for the greater numerical strength of the former, for although *Pygoscelis* lays one more egg than its larger relative, the king penguin's single offspring seldom if ever becomes the prey of the skua, which plays such havoc among the rookeries of the johnnies.

The hypothesis which I have advanced would be as applicable to any other austral region as to South Georgia, for the same physiographic and biological conditions have doubtless obtained throughout a wide circum-polar belt.

The faith which the johnny penguins hold in the protectiveness of high land is strangely shown by their habit of running *away* from the water whenever danger threatens. Their enemy, the sea leopard, has fixed within them an instinct which urges them to seek safety only on *terra firma*. Consequently they do not govern their acts according to their perceptions. Time and again I have seen a group of them standing at the water's edge when a fox terrier, brought ashore from the *Daisy*, started toward them at a run. If the penguins deigned to show any fear

*At South Georgia I have seen seal elephants (*M. moschatus*) drag themselves so far from the water that they became a hindrance to johnny penguin nests on low ground at the outskirts of the rookery.



1. The summit of the large *Pygoscelis* colony at the Bay of Isles, Jan. 10, 1913. The undersized nest at the left was the highest of the whole colony. Just after the picture was taken, the johnny in the foreground made a furious rush at his near-by enemy, the skua. In the background is Lucas Glacier.



2. Colony in a low meadow near Nordenskjöld Glacier, Cumberland Bay, Dec. 3, 1912.

at the approach of the barking dog they invariably responded not by taking to the water, where they would have been rid immediately of the tormentor, but by deliberately running *up* the beach, heading for the nearest bank or hillside. Even after the dog had seized a penguin by its bristly tail and had swung it round and round merely for the fun of teasing, the poor dazed victim would still persist in scampering away from the water. I myself often found that the surest way to keep penguins ashore was to try to drive them into the sea. At Cumberland Bay, however, where several hundred whalers have dwelt for a number of years, some of the penguins have adapted themselves to the new conditions, and I saw birds in the neighborhood of the whaling station take promptly to the water when they were chased.* Klutschak also cites an instance in which the johnny penguins had profited very quickly by bitter experience. He writes:

In spite of their ingenuousness, the penguins have also much cunning as the following episode will demonstrate. These birds usually lay their eggs among patches of sparse grass at an elevation of several hundred feet above the sea. Our Portuguese sailors, tiring of the ship's fare, climbed a hill one evening, drove away the penguins, and gathered up all the eggs that they could find. At a later date they repeated the raid, but, trying it a third time, they found neither eggs nor birds. Then for several days no penguin was seen. But one morning our attention was called to some white specks moving down the abrupt slope of a mountain toward the sea. The specks proved to be our penguins descending for their bath. After several hours they climbed up again to their new village where they had found security for themselves and their eggs, for our Cape Verders, as much as they would have liked another feast, were too lazy to attempt the difficult ascent. (Translation).

The antiquity of the hill-climbing instinct among the johnny penguins of South Georgia is attested by a strange and romantic phenomenon, namely that the penguins go back to the heights to die. In a hollow at the summit of the coast range south of the Bay of Isles lies a clear lake on a bed of ice-cracked stones. This transparent pool, formed entirely of snow-water, with a maximum depth of three or four meters, is a penguin graveyard. In January, 1913, I found its bottom thickly strewn with the bodies of penguins which had outlived the perils of the sea and had apparently accomplished the rare feat among wild animals of dying a natural death. They lay by scores all over the stony bed of the pool, mostly on their backs with pinions outstretched, their breasts reflecting gleams of white from the deeper water. Safe from sea leopards in the ocean and from skuas ashore, they took their last rest. For months,

* Sharpe writes (1907, p. 146, Kerguelen): "When they became exhausted by being chased by men, the penguins jumped for a short distance, and then, when they were tired, they took to the water."

perhaps years, they would undergo no bodily change in their frigid graves.

The nests of *Pygoscelis papua* at South Georgia are more or less bulky mounds of humus and wisps of tussock grass, usually though not always on a foundation of small stones. Sometimes the floor of the nest is lined with a mosaic of pebbles on which the eggs rest. Nests on the hill-tops are smaller than most of those on low ground, doubtless because of scarcity of vegetation in the former situations. In crowded parts of the colonies I saw a few nests built on the tops of glacial boulders about a meter high. The birds are notorious for stealing each other's nesting material.

Both parents incubate, relieving each other at intervals of several days. The change is made quickly so that the eggs are never exposed more than momentarily. On the lower belly of the sitting birds is a narrow, longitudinal area of bare skin, scarcely discernible on a dead penguin, but capable of being spread by voluntary muscles. This warm, vascular brood-patch is applied directly to the two eggs* which lie one before the other under the bird. After the eggs have cracked it still remains a serious proposition for the young penguins, which are extraordinarily feeble during the first few days of life, to work their way out of their thick-shelled prisons.

The nesting johnny penguins are generally timid, scampering off at the approach of a man, but never retreating more than a few paces. A small proportion of them stand their ground on the nests and show fight, employing as weapons both bill and wings. With the latter they can strike rapid and forceful blows. On one occasion a bird which I had roused from sleep attacked me and beat such a furious tattoo upon my leather leggings that its own pinions were soon bleeding. When a brooding penguin is driven away from young nestlings, it lingers near by, trumpeting loudly until the disturbance is over; then it examines its offspring very minutely, stooping down near-sightedly, and scrutinizing one and the other over and over again. When satisfied that all is well, it settles down contentedly. The incubating birds turn around in their nests so as to keep their bills pointed toward the skuas that walk about the rookeries with evil purpose and wait patiently hour after hour for a chance to steal an egg. Eternal vigilance is the price of safety for the

* At the South Orkneys, according to Eagle Clarke, the eggs of *P. papua* "were usually two in number, frequently only one, never three." At South Georgia von den Steinen twice found nests containing three eggs. The period of incubation is about thirty-three days.



The long road from the sea to the hilltop colony. Bay of Isles, Jan. 10, 1913.

penguins. The sitters hiss sharply whenever a skua draws near, and the unoccupied penguins make angry but vain rushes at the common enemy.

Besides the hiss of wrath the johnny penguins have a variety of louder calls. The ordinary trumpeting note sounds like the noise of a tin horn or the braying of an ass; the sound is double, being produced by both expiration and inspiration, and is accompanied by a rising and falling of the lower throat between the branches of the furculum.* The voice is pitched in a much lower key than that of the king penguin. Usually the head is pointed upward while the penguin trumpets. The mouth is held wide open, with the spiny tongue showing, and in cool weather the expelled breath condenses into clouds of vapor. The trumpeting is often repeated many times without interruption; under excitement the birds' whole bodily energy seems to be put into the call. Another note is a short, single "caw," which the penguins are apt to utter as soon as they emerge from the sea. This call sounds like a hail from one man to another, and the human suggestion is enhanced by the penguins' habit of waving their flippers as if beckoning. The weak trumpeting of nestling johnnies have a peevish, scolding quality, even hysterical at times. The youngsters have also a soft, peeping note, indicative of well-fed contentment.

By the time of our arrival at South Georgia the nesting season had begun,† and two Cumberland Bay rookeries which I visited on December 3, had already been robbed of their eggs by the crew of a Norwegian whaling steamer. The birds had, nevertheless, begun to lay a second time,‡ and most of the nests contained at least one fresh egg. Among the eggs were several "runts," possibly the result of the abnormal ovulation. The smallest of these imperfect eggs, which contained no yolks, measured only 24 x 20.5 millimeters.

On December 23 the large rookery at the Bay of Isles, which had not been disturbed by human beings, contained plenty of young penguins,

* The sound can be faintly reproduced with the syrinx of a dead penguin.

† Von den Steinen records that courtship begins toward the end of September. He found the first eggs at Royal Bay on Oct. 26, 1882. At Kerguelen Island eggs are common early in September.

Writing of the species at the Falkland Islands, Abbott, *l. c.*, says that some of their breeding places are "several miles inland," and that the birds "commence laying almost always on the same day, viz. 7th October."

‡ Kidder collected at Kerguelen Island eggs of this species which he believed must have been at least the ninth or tenth laying since the season commenced. Six consecutive layings have been observed at South Georgia after the loss of eggs. Von den Steinen points out that eggs of the second and later broods are smaller and rounder than those of the first. Moreover, the size of the set becomes reduced to one egg.

the oldest of which seemed to be half-grown.* Some of the nests held one egg and one chick, and among the further advanced families there was a great difference in the size of the two chicks due to the discrepancy in their dates of hatching, which sometimes amounted to four days. Not infrequently the senior chick was fully twice as large as its nest-mate. Nests which contained nothing but one youngster were also very numerous; doubtless the skuas, which were ever eyeing the rookery from points of vantage round about, had accounted for the other.

The youngsters are fed from the crops of the old birds and grow very rapidly, early development showing especially in the abdominal part of the body. Within three or four days of hatching, the chicks become veritably anchored in the nest by the weight of their corpulent bellies which seem out of all proportion to the puny neck and wings, and the soft, insufficient legs. Within these distended stomachs I found disintegrated crustaceans, small cephalopod beaks, and pebbles. The only identifiable food material found in the alimentary tract of adults was examples of the pelagic, mysidaceous shrimp, *Antarctomysis maxima*.

On December 29 many of the young penguins were half-grown, although a good proportion of nests still contained eggs. By January 10 only one nest in about thirty held eggs, and on January 24 no eggs remained excepting a very few addled sets still covered by the patient parents.

By the middle of January the young were mostly two-thirds grown, and their incessant chattering could be heard a long way from the rookeries. The older youngsters walked about in an uncertain, wobbly fashion, tagging after their fathers and mothers and trumpeting nervously when left too far behind. When I walked among the nests, all but the youngest chicks left them and herded together. The brooding adults, too, rushed away, but a few squeaks from the abandoned little ones usually brought them back, scampering hither and thither and swinging their wings frantically. If the youngsters happened to be old enough to walk, the parents coaxed them along by giving small tastes of food, with promises of more, but in hysterical fashion they would soon forget to wait for their feeble babies, and would have to be called back repeatedly. The youngsters, even when very large, are fond of snuggling as closely as possible against their parents.

When caught in the hand, the fledglings strike with their harmless little wings and attempt to bite, at the same time protesting with high-

* Von den Steinen observed the first young on Nov. 10.



1. Sea leopard (*Hydrurga*), yawning in contented leisure on the floe ice in front of Grace Glacier. The widely opened mouth of the animal faces the camera. After a meal of penguins, these seals often come out of the water for a nap.



2. Johnny penguin in the graveyard pool, Bay of Isles, rolling its back above the surface. The bird is swimming toward the right of the scene.

pitched voices. After a few moments, however, they become absurdly tame and confident, and enjoy having their plushlike backs stroked.

By the end of January all but a very few of the young penguins, still clad in the softest of gray and white "fur," had permanently deserted the nests and had congregated by themselves, but always under the guard of adult nurses. In fine weather they might be seen sunning themselves on the snowbanks, and at other times crouching from the wind in sheltered hollows. Some of them were as large as the adults, but they were still dependent for their food, and they had not yet been to the seashore. I often saw them pleading to be fed when the old birds evidently did not wish to gratify them. Such begging youngsters ran about after the adults, following every dodge and turn, continually bumping into them and stepping on their tails until the harassed adults gave up in despair. The young ones would then press closely against the provider, open their little bills expectantly, and lose nothing of the regurgitated meal.

Young penguins do not go into the sea until they have lost completely their coat of down. In this respect they differ from all other aquatic birds, and since the molt of the down is so important an event in the johnny penguin's economy, the plumage sequence should be treated of in connection with growth. On emerging from the shell the young johnnies are clad in a nearly uniform covering of straight filaments, whitish or light gray except on the top of the head, where they are of a dark slate color. These natal filaments are attached to the tips of the juvenal down feathers, which are highly complex and dense, and which sprout within a few days after hatching, clothing the nestling in dark gray and white, on the dorsal and ventral surfaces respectively. The wings are included in this vestment of woolly down. Traces of the frail natal down cling to the new coat for some time, but eventually disappear through wear. The egg tooth adheres to the young penguin's bill until the bird is nearly fully grown.

About the first of February most of the young begin molting the juvenal down, thus exposing the adult plumage feathers which have grown out beneath. The appearance of the white head-spots is the signal of the coming change. The down is shed in sheets and patches; the process resembles the peeling of the velvet from a deer's horn. By the middle of February, or toward the close of the molting period, clinging tufts, collars, or top-nots of down give the otherwise smooth young penguins the appearance of clowns and pierrots. The last of the down

to go is that on the hind-head, neck, and shoulders. When the changed has been completed the youngsters are distinguishable from their elders only by their sleeker appearance, short tails, pale feet, small, light-colored bills, and voices which are unmistakably childish. At this age they still remain together in bands, and spend a good deal of the day in sleeping. They are, however, quite as inquisitive as the old birds. Until the end of February or later they are dependent for their food, and they are fed at least partially by regurgitation up to the middle of March.

On March 12, at the rookery on the west shore of Possession Bay, I saw many fully grown young penguins following the old birds and demanding food. One youngster chased a sorry looking adult to the water's edge where the latter turned and proceeded to pump up a meal. After a few moments, however, this persecuted parent, or foster parent, tore away, plunged under a breaking wave and was lost to view. The insatiable young penguin followed it into the surf but came out again discomfited within a few seconds.

The postjuvenile molt of the nestling johnny penguins is succeeded closely by the annual postnuptial molt of the adults. Toward the end of February the feathers of the latter, already much faded and frayed, begin to drop out, further to litter up the ground of the rookeries, which have become evil-smelling and filthy from the surface mixture of mud, decaying tussock grass, excrement, down feathers, and dead nestlings. The molting season of the adults seems to endure all through the summer, the plumage coming off in patches. A period of several days intervenes between the loss of the contour feathers and of the long, stiff rectrices.* On March 12 I observed that a few of the adults had not yet begun to doff their old coats, which were brown, rough, and threadbare. Many more, the majority of the birds in fact, were in the throes of the process and were exceedingly ragged, the new plumage showing in spots. Others had completed the molt of the body feathers, but still retained their long tails, while the most advanced birds had dropped all their old feathers including the rectrices, a temporary loss which gave them a more dumpy outline than ever; for appearance sake a johnny can ill afford to be without its luxuriant tail. There is also a practical disadvantage, since these birds use the stiff, bristly tail feathers as a prop. Certain changes

* Seth Smith records that the rectrices of a captive king penguin were the first feathers to be molted. This is also in accord with the testimony of other observers of penguins. I, however, saw many freshly molted examples of *Pygoscelis* with long tails.



1. An unusually bulky nest of the Johnny penguin, in a meadow colony at Cumberland Bay. Dec. 3, 1912



2. Johnny penguin on its nest, which is situated on top of an old hummock. The flexure of the bird's wing is noteworthy.

in the colors of soft parts accompany the postnuptial molt. With the change to the new plumage the birds acquire orange feet, and the inner surface of the wings, salmon pink in color during the breeding season, now becomes white or nearly so.

Pygoscelis papua has not in any degree the fearless and courageous disposition of its Antarctic congener, *Pygoscelis adeliae*. On the contrary, bands of johnnies along the beaches are prone to take alarm if a man appears suddenly among them. The most successful course of action is to approach them slowly, halting at a discreet distance and so inviting the penguins to take the initiative. They have a large bump of curiosity and will presently push the acquaintance, their familiarity increasing in direct proportion to the quietness and seeming indifference of the observer. A description taken from my notes of December 23, 1912, is characteristic. On the afternoon of this day I walked to a glacial pond on the far side of which stood a group of johnny penguins. As soon as they saw me one of their number swam across under water and walked toward me. I remained motionless until it came up quite to my feet and stood there. When I moved quietly it followed, and when I stopped it did likewise. Then, one by one it was joined by the other penguins from across the pond. It was whimsical to see this troop of mimicking small brothers with no other wish than to keep me company. I finally broke the spell by stooping to pat one on the head, when they all wiggled their tails, hurried back into the pond, and swam across like porpoises.

On March 12 I rowed ashore during a brisk snowstorm and found a whole army of penguins near the Possession Bay rookery before mentioned. They were standing by hundreds in a long double row along the beach. These rows marched forward to meet and surround me, and their numbers were continually augmented by new arrivals which kept popping out of the surf, and came running up the shingle as if much astonished to find me there.

The amusing, myopic curiosity of the johnny penguins is illustrated by the furtive way in which they inspect any striking or unfamiliar object. They pick up odd bits of kelp, bleached bones and other rubbish, carrying them for short distances, and I have seen a band of them walking around and around the fresh carcass of a seal, pecking at it with their bills.

I saw nothing to indicate that the johnny penguins² share the social pugnacity of *Pygoscelis adeliae*. They would, indeed, sometimes fight boldly enough in defense of their young, as I have related. They would also protect themselves, with many loud outcries, from the attacks of our ship's fox terrier. Through hard experience the johnnies at the Bay of Isles learned to ward off the dog by huddling back to back in a sort of Macedonian phalanx, striking outward with quick wings at whatever point it attacked. But the nearest approach to a fight between two of the penguins that came to my notice was only a half-hearted affair. A couple came out of the surf one day, within a few feet of me, and immediately commenced to slap and prod one another. They continued merrily for perhaps a minute, when they spied me and, instantly forgetting their differences, came up the beach to have a close look at the intruder. In several instances I captured adult penguins by running them down. Such birds naturally attempted to bite and strike, but only for a few moments; if their backs were stroked from neck to tail their accelerated docility would seem almost hypnotic.

The free penguins, *i. e.* those not incubating or brooding, spend much time sleeping, particularly on sunny days. They have two resting positions; one sitting bolt upright with the head turned behind the shoulder and the bill tucked under the axilla; the other lying flat on the breast with the feet bent forward among the feathers, the wings pressed against the sides, and the head drawn snugly back. The upright position is commonly maintained during a daytime doze, but birds discovered along the beaches after dark were always found to be sleeping upon their bellies. A nap is followed by the toilet, the penguins preening themselves with much care, fluffing out the entire plumage until each feather lies as smoothly as a scale.

The johnnies walk in a deliberate manner, raising their feet high at each step, carrying their tails well above the ground, thrusting their wings behind them as balances, and poking the head forward into the accustomed near-sighted attitude. Their near-sightedness is probably no less real than apparent, because of the specialization of their eyes for vision through a medium of water.

²Engelhardt has exactly the opposite regarding this species at the South Orkneys. He says that they fought fiercely among themselves using both wings and bills. Dr. Henryk Arctowski also has on more than one occasion written that *Pygoscelis adeliae* was regarded as the most pugnacious of the penguins in the regions visited by the *Belgica*. But the experience of Dr. Gain, Naturalist of the Chareot Expedition, is that this species differs from other penguins in that the birds *live in the*

In crossing the stony or hummocky beaches that separate various arms of the bays, or which lead from the sea to the snow-water ponds in which the penguins delight to play, they follow regular, well-tramped avenues. When bent on a definite journey across the land, they trudge along very steadily and unconcernedly, and for the time seem to take no notice of their fellows. When in great haste, they fall upon the belly and run on all fours. By this well-known mode of progression, called "tobogganning," they can lead a man a very creditable chase. Their most curious attitude is assumed when they walk down an incline, such as a snow-bank or a steep beach. The head is then thrust so far forward that the straight neck and the spine form a right angle; the wings are held stiffly back as far as possible, and the round belly projects as the bird proceeds with gingerly steps. On rare occasions they hop instead of walking, springing with both feet from one beach pebble to another, in the manner of the true "rock-hopper" penguins (*Eudyptes*). Their fat bodies seem to be made to stand hard knocks, for not only do they tumble over frequently wherever the walking is rough on shore, but they also suffer fearful batterings on the shingle when they come out of the surf, sometimes being bowled over by four or five successive breakers before they can scramble out of the undertow.



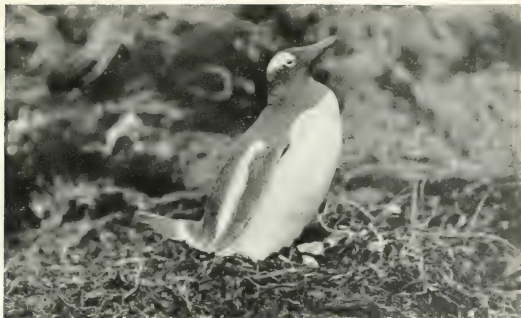
Fig. 3. *a.* Trumpeting *b.* Walking on level ground *c.* Descending a bank. *d.* Wading into the water.

When wading into the water, the johnny penguins invariably round their shoulders, bend down their heads almost to their feet, and scoop beneath the surface as soon as there is depth enough to float them. Once under way, all their terrestrial awkwardness vanishes. They swim with well-nigh incredible speed, remaining below the surface except when they leap out porpoiselike, giving an audible gasp for air—to be gone again within the twinkling of an eye. So quickly is this leap completed, that penguins playing before the bows of a vessel, as I saw them from the bridge of a South Georgia whaling steamer, might easily be mistaken

for jumping fish. Often while I was rowing in my dory between the brig and the shore, shoals of johnnies would swim around the small boat, and after long submergence would skip out of water five or six times in rapid succession. During the "porpoising" they hold the pinions straight out from the body, not pressed against the sides. The maximum length of the leap hardly exceeds two meters.

One evening I stood knee-deep in the water of the Bay of Isles and watched at close quarters four johnny penguins swimming. The sea was fairly calm, the water clear and brilliant in the sunset light. The quartet of penguins darted hither and thither all about me, now and again almost brushing my legs. Frequently they rolled their backs above the surface, and more rarely they leaped out. I distinctly observed that the strokes of their flippers were sometimes made alternately and sometimes in unison. Probably they were feeding, although I could not see their prey. Whether for sport or a more serious purpose, they occasionally swam in the ridge of an advancing swell, going so far up the beach that they were left stranded for a moment. Presently three of them walked out of the sea, shook the water from their tails, and became so immensely interested in watching me, that they pursued me for a while when I left the spot.

On another occasion, January 10, 1913, I witnessed an extraordinary diversion of the penguins in the graveyard pool mentioned on page 117. This pond, lying in a hollow of the hills, was bordered on three sides with a perpendicular bank of hard snow, the remaining shore being a stony slope. On the afternoon of my visit penguins were swimming in it, for pure enjoyment, of course, for there was no food, no living thing, not even a visible alga, in the transparent snow water. How alert and reptilian the penguins seemed in their own element! How unlike the inelegant, ridiculous creatures they are ashore! They dashed straight-away under water the length of the pond and back again, with a velocity which I had then an opportunity to compute as about ten meters a second. They chased each other round and round, flashing into the air twice or thrice during their bursts of speed, every action plainly revealed through the clear, quiet water, with the white corpses down below. When the swimmers rested at the surface only the white-filleted head and up-pointed, ridged tail showed, as a rule, but sometimes they would float higher, like grebes. Several of them tried to leap out onto the bank of frozen snow which rose about a meter above the water. Strangely enough, they misjudged their distance repeatedly; they jumped too soon, and were on the downward segment of their arc before



1. Rising suspiciously from the nest Dec. 3, 1912



2. The "brood-patch," which the bird has spread as it is about to settle on the eggs. Ordinarily there is no outward sign of this bare area.

they had cleared the edge. I saw one individual try a dozen times and fail; it always leaped a few lengths too soon and whacked its shiny breast against the wall of ice. A group of birds, which had been sunning on a snow bank, entered the water as if by mutual agreement. Some of them walked to the rocky slope and waded, arching their necks and tucking their heads under water before they made the plunge. Others flopped off the edge of the ice. I say flopped because they did not make graceful standing dives, such as I had expected; on the contrary they entered with flagrant, splashing "belly-bumpers." All of the birds when first going into the water executed a curious maneuver, the object of which I do not understand. Immediately after the plunge they came to the surface and lay stiffly, first on one side of their bodies, then on the other, and beat with the uppermost wing and foot, kicking the latter back and forth, and rubbing the wing across the feathers of the side, as if trying to wet themselves thoroughly.*

The great discrepancy between *Pygoscelis papua* and *P. adeliae* in jumping and diving ability is at first sight rather surprising. Through the medium of the films taken during the Australasian Antarctic Expedition I have seen the prodigious, salmonlike leaps of the plucky little Adélies, while the photographs of Levick well illustrate the graceful dives of these denizens of uttermost southern shores. It must be borne in mind, however, that *P. papua*, with a Subantarctic range, breeds on no land which has an ice-shelved coast. The ability to gain the land by a catapultic spring has doubtless vanished with the disappearance of the necessity for such a method. Occasionally I saw johnny penguins on the very brinks of South Georgia glaciers where they abutted on the bays, but in all such instances the birds had climbed up over a sloping edge, and they invariably returned by the same route.

The johnny penguins often feed far at sea, at least sixty or seventy kilometers from the coast of South Georgia, but during the long breeding season they apparently all return to the land for the night. In the late afternoon we usually saw long troops of them porpoising into the fiords from sea. This habit is so well known that sealers, overtaken in their boats by an impenetrable South Georgian fog, rely upon the homecoming penguins for the direction of the flat beaches.

Considering the fact that most natatorial birds swim as soon as they

*Writing of the behavior of the Clark's penguin reports: "After they dive they roll over and come to the surface and wash themselves thoroughly with the water, and then they go back to the water." The behavior which I have described is not unusual.

emerge from the shell, the tardiness of young penguins in taking to the water has been pointed out as a remarkable phenomenon. The explanation of this, however, is doubtless that the speed and stamina required in capturing living pelagic food, in escaping from the dreaded sea leopard, and in swimming through breaking surf, can not be developed early in life by birds which use the *wings* instead of the feet as propelling organs. Certainly the pinions of nestling penguins seem extraordinarily under-developed. The little birds begin to exercise them soon after birth by flapping them, weakly at first but vigorously later on, a trait that suggests ancestral aspirations for flight. The young johnnies never enter the water of their own accord until they have completed the post-juvenal molt. I was informed by sealers at South Georgia that the youngsters then receive from the adults a sort of discipline strongly resembling "swimming lessons,"* but it was never my privilege to witness this interesting performance.† On many occasions I put nestlings of various ages, as well as fully grown, molting young, into the fresh water ponds where they proved themselves almost as helpless as human beings unfamiliar with swimming. They instinctively put their heads under water and tried to swim below the surface in the approved fashion, but it was a feat quite impossible for them. They beat the wings simultaneously, and bobbed up and down without making much progress. Such a scene always attracts a band of skuas to the spot, as if these ogres realized the helpless misery of a young penguin in the water. The skuas do not strike while their prospective victim is swimming, but pace along the shore waiting to intercept its landing. Once a half-grown youngster, with which I had been experimenting, crawled out of the grave-yard pool into the very jaws of seven skuas which attacked it *en masse*. The little penguin struck with its feeble wings and cried out piteously. Insignificant as it was, not one of the skuas dared seize it outright, but they made quick rushes from all sides, striking the penguin on the head with closed bills, and then retreating. I hurried to the rescue and restored the little bird to its nest where I afterwards saw it resting characteristically with its head hidden between its mother's warm, feathered thighs.

It seems to the writer that the name johnny penguin might well be

*Leach confirms the truth of this by his observations on the Adelic penguins.

†Most of the johnny penguins are said to migrate to sea during April, although a few linger about the shores of South Georgia into the winter. Dr. Gould the *Penguin* has ascertained by banding examples of *P. minor* at Petermann's Island that the same birds come back to the same rookery year after year. It seems probable that the young spend nearly two years at sea before returning to breed.



1. About to "relieve guard." The white streaks on the hummock are excreta from the sitting bird. Cumberland Bay, Dec. 3, 1912.



2. Johnnies, setting their flippers as balances, and starting toward the sea. Dec. 3, 1912.

accepted as the book vernacular for *Pygoscelis papua*. "Papuan" penguin, which has been sometimes used, is grossly misleading, while "gentoo" is a term of East Indian origin, first employed by Europeans as synonymous with Hindu. "Johnny" is the sea name, of old standing and wide distribution, a genuine vernacular. It carries an appropriate connotation of roly-poly small-boyishness; it is a name which fits the bird.

Measurements in millimeters of ten specimens of *Pygoscelis papua* are as follows:

Collected Mar. 12, 1913		Bill from gape	Bill from nasal feathers	Wing from axilla	Tail	Foot
R. C. M. 1934	young	68	35	225	120	128
	ad.	72	41	242	140	143
	ad.	75	39	236	139	126
	1938 ♂ ad.	85	45	234	140	137
	1939 ♂ ad.	73	39	236	132	129
	1940 ♂ ad.	82	39	241	new	131
	1941 ♂ ad.	78	40	238	144	128
	1932 ad.	77	39	237	new	129
	1933 ♂ ad.	75	40	231	132	133
	1935 young	62	30	220	112	117

In several examples collected or observed the white spots of the head were not joined by a band across the forehead.

The pupil of the eye in this species is rhombic when contracted.

The eggs are rounded or subspherical, greenish-white in color. In a series of eighteen, the measurements show no variation which is not comprised within the dimensions of one of the following four examples: 74 x 57 (longest); 62 x 54 (smallest); 65 x 57 (nearest to spherical); 73 x 59 (largest). In a typical set, the two eggs measure 70 x 59 and 72 x 60. A "runt" collected on December 16, measured only 46 x 47 mm. Such eggs are a product of reiterated laying. Von den Steinen found that the average weight of a series of eggs taken at Royal Bay was 137 grams.

***Pygoscelis antarctica* (Forster).**

Pygoscelis antarctica Cat. B. Brit. Mus., XXVI, p. 634.

In company with one of the officers of the *Daisy* I made a foot journey over the mountain pass from Possession Bay to Antarctic Bay on

March 3, 1913. Our fox terrier presently began to worry two small penguins which stood on a pile of rock some four hundred meters back from the water. As soon as I heard the strident voices of the birds I knew that they were not *P. papua*, and on investigation they proved to be *P. antarctica*. A few minutes afterwards I met a third in the midst of a flock of a dozen *papua*. The presence of the stranger was evidently not welcomed for several of the johnny penguins were pecking and striking it.

All three of the ringed penguins were molting.

This species was found breeding at Royal Bay by the German Expedition of 1882-83. It is known, also, from the Falklands. It is not typically a Subantarctic form, however, its center of abundance being in West Antarctica and the out-lying islands.

Of my three specimens one was preserved in alcohol and another prepared as a skeleton. The measurements of the third, a skin, are :

	Bill from gape	Bill from nasal feathers	Wing from axilla	Tail	Foot
No. 1913 ad.	65	36	120	11	94

Irides straw-color.

Recently I have received a fourth specimen, a female collected at Cumberland Bay, South Georgia, in February 1915.

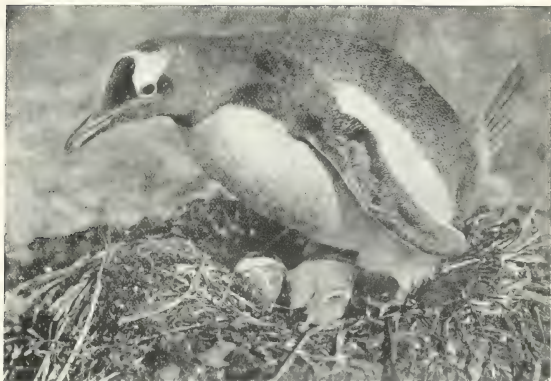
Eudyptes chrysolophus (Brandt).

Catarrhantes chrysolophus Cat. B. Brit. Mus., XXVI, p. 641.

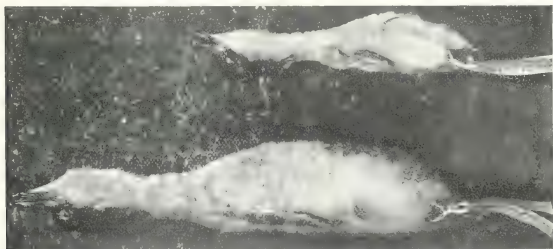
The macaroni penguin was evidently common at the time of Weddell's visit, but the German Expedition of 1882-83 found only a single straying example.

I did not see this species during my stay. That it still exists, however, I was first assured by a letter dated at South Georgia, July 5, 1914, and received by me from Mr. José G. Correia, a New Bedford whaler. From this letter I extract the following paragraph, translated from the Portuguese :

Captain Larsen asked the commander of the *L'Adieu* to bring four of the penguins which have orange feathers on their heads. These are called maccaronas,



1. Parent with one egg and one newly hatched young Bay of Isles, Jan. 10, 1943.



2. Nestmates, collected at the Bay of Isles, Dec. 26, 1942. Discrepancy in size is the rule.

and there are very many of them at the southwest point of the island. I asked him also to bring two for me. When he returned from the trip I went on board, but he had found only four, and these went to Captain Larsen.

Recently, however, Mr. Correia has sent me the skin of an adult female collected at Cape North, near the western end of South Georgia, on February 2, 1915. Its measurements are as follows:

Bill from gape	Exp. culmen	Longest crest plumes	Wing from axilla	Tail	Foot
63	56	72	176	66	112

"Irides red."

Of the two other small species mentioned by Weddell, the "jack-ass" penguin is obviously *Pygoscelis papua*. The "stone-cracker" is assumed to have been *Eudyptes chrysocome*, and is so listed in the British Museum *Catalogue*, p. 636. Von den Steinen (*loc. cit.*), however, believes that *Pygoscelis antarctica* is Weddell's stone-cracker, and if this be correct there is no valid record for *Eudyptes chrysocome* at South Georgia.*

Spheniscus magellanicus is given in the *Catalogue*, p. 651, as the jack-ass penguin of Weddell, an interpretation which is certainly erroneous. South Georgia, an essentially Antarctic land, is far without the range of the continental, south temperate, even tropical, genus *Spheniscus*.

APPENDIX.

Confusion and uncertainty have clouded few zoological subjects more thoroughly than the life-history of penguins. Most of the early accounts of these birds were either utterly unreliable, because of the observers' lack of ability to inhibit their imaginations, or else so strangely true as to seem incredible to later, more critical generations.

Since members of the recent Antarctic expeditions have to a great extent worked out and popularized the marvelous social customs, the growth and development, and the life in the sea and on shore, of penguins, the time has passed for tolerating in compilers of ornithological text-books an infinite repetition of other people's errors. As examples of the many untruths and half-truths which occur in recent reference works of pretentious standards, I should like to refer to several of the more

conspicuous statements of doubtful worth in the ninth volume of the *Cambridge Natural History*, London, 1909. In this general treatise on "Birds," pages 54 to 59 are devoted to the order Sphenisciformes. From this section I quote the following statements, with comments. The italics, wherever they appear, are mine.

Penguins in general :

Page 55. 1.—"these flippers or paddles have highly compressed bones *with no power of flexure*." Regarding the absurdity of this clause, I have shown above that its meaning is not true.



Fig. 4. Tongue and divided trachea of *Pygoscelis papua*.

2.—"the tongue [is] often rudimentary." No reference is made to the well-developed tongue, highly conspicuous and interesting because of its covering of spines, which is found in many, probably most, species.

Page 56. 3.—"the two *awse-flavored* eggs." Penguin eggs number one, two, or three, according to the species. Those of all the Antarctic penguins have been described as delicious eating, or if criticized, it has been upon the ground that they are slightly "insipid." The eggs of the king and johnny penguins have a less pronounced taste than a fresh-laid hen's egg, and consequently require more salt. The one objection to them lies in their appearance, for the albumen does not coagulate readily, and, as von Steinen remarks, a boiled penguin egg resembles a jelly-fish.

4.—"incubation, which lasts about six weeks." For penguins of the genus *Pygoscelis* this period has been determined as from thirty-one to thirty-seven days. The emperor penguin is believed to incubate two months, or thereabouts.

5.—"the parents sit very closely and feed the *blind young* for an exceptionally long period, by *inserting their bill in that of the nestling*." The young of *Pygoscelis papua*, and presumably of its near relations, hatch bright-eyed from the shell. The young of only the *Aptenodytes* penguins are fed as long as those of the wandering albatross, for instance; and, as for inserting the bill, it is done not by the parent penguins but by the chicks, whose heads disappear within the gullets of the adults.



1. Parent with two half grown, pot-bellied nestlings. Bay of Isles, Jan. 10, 1913.



2. Parent with one youngster, which has left the nest. The sneaking attitude of this squeaking chick is characteristic.

6. "The nestling in down is blackish or yellowish-brown with white lower parts." *Pygoscelis papua* and *P. antarctica* have gray juvenal down. The latter species is pure white when hatched. The young of *Pygoscelis adeliae*, of *Aptenodytes patagonica*, and others, do not have white lower parts.

Penguins considered specifically :

Page 57. 7. The account of the king penguin is misleading in several particulars. Purely incidental notes made by Professor Moseley regarding this species at Prince Edward Island, are here used as generalities. Among them are the broad statements that the "breeding grounds are flat places of hard soil covered with slime;" that the birds run at a great pace "maintaining an upright position;" and that "they pass to and from the water singly, and not in flocks, as do other species." As long ago as 1834, it was recorded that king penguins at Macquarie Island marched to and from the water in flocks of thirty or forty thousand.

Page 58. 8.—"there seems to be little doubt that the incubating position is at least half upright in the case of penguins generally." (1. photographs of any species of *Pygoscelis*.)

Page 59. 9. The rock-hopper penguins "have a most curious habit of stretching out the legs below the tail, *laying their wings flat to their sides*, arching their necks forward, and then making a sudden spring clear out of the waves." Truly a curious habit, for by laying their wings to their sides they must take away their only means of making the spring.





1 Young johnny penguin at the beginning of the post-juvinal molt. Bay of Isles, Feb. 14, 1913.



2 Downy young, under guard of adult nurses, on a tussock-grown hillside near Lucas Glacier. Feb. 4, 1913.



1. Three frightened youngsters running at top speed. Feb. 4, 1913.



2. Well grown young, Feb. 4, 1913. The appearance of the white eyespot is the signal of the approaching molt of the down.



1. Downy young, adult nurses, and molting adults. Bay of Isles, Feb. 4, 1913. The youngster in the foreground stands in the "ecstatic attitude," and is trumpeting.



2. Johnny penguins swimming at the surface of a fresh water pond. Bay of Isles, Jan. 16, 1913.

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A CONTRIBUTION TO THE ORNITHOLOGY OF THE
ORINOCO REGION.

BY GEORGE K. CHERRIE.

This paper is based chiefly on specimens in the collection of the Museum of The Brooklyn Institute of Arts and Sciences, obtained by the writer, together with his field notes on the same.¹ It includes, however, observations on the specimens sent to the American Museum of Natural History from the vicinity of Ciudad Bolivar on the Orinoco and various points on the Caura River by Mr. Samuel M. Klages.

In 1905 collections were made by the writer for the Brooklyn Museum in the vicinity of Ciudad Bolivar and the village of Caicara covering the period from April 3rd to June 24th inclusive. In 1907 collecting was carried on in the same localities as in 1905, and in addition at various points on the River San Feliz, near its junction with the River Cuchivero, a tributary of the Orinoco, entering that stream some forty miles below the village of Caicara. Also a week's time was spent in the middle delta region of the Orinoco at the village of Las Barrancas. The collecting in 1907 covered the period between April 6th and August 7th inclusive. In addition, however, to the notes on specimens in the Brooklyn Museum collection, there have been added certain notes and observations on species collected and observed by Stella M. Cherrie and the writer in the valley of the Orinoco in 1897, 1898, and 1899, while engaged in collecting birds for the Tring Museum, England. Thus not only are

¹The manuscript for this paper was completed some five or six years ago, and passed out of the author's hands at that time. After some vicissitudes, it was being published under the editorship of the late Edward L. Morris, acting Curator-in-Chief of the Brooklyn Museum. His untimely death left it partly in page proof and partly in galley proof. The old proof sheets have been placed in the writer's hands, and recently published investigations of various students of tropical American ornithology have made considerable revision necessary. The paper, therefore, is not as complete as might be desired, nor does it represent the most recent views on classification.

I wish to express my sincere gratitude to Mr. Waldron DeWitt Miller for his patient, careful work in reading the proof. To Dr. J. A. Allen and Dr. Frank M. Chapman I am also indebted for granting me full use of the collections in the American Museum of Natural History.—THE AUTHOR.

species actually represented in the Brooklyn Museum collections included, but also all additional forms that were collected or observed on my first expedition to the Orinoco; while, to make the paper more complete, and particularly in the interest of those who may not have access to Berlepsch and Hartert's paper "On the Birds of the Orinoco Region,"¹ there are added all species from the Orinoco proper, and its tributary the Caura River, included in that paper, but not observed by the writer. Also, species that have been recorded from the Orinoco region, since the publication of Berlepsch and Hartert's paper, and that have come to the notice of the writer are included.

Where colors are given of the eye and naked parts about the head, of the bill, and of the feet, they are the result of a direct comparison with the colored plates in Ridgway's "Nomenclature of Colors" and were made in the field from freshly killed specimens.

For almost all groups "keys" for the more ready determination of the various genera, and their species, have been inserted, following the preliminary observations under each of the family headings. Many of these keys, with slight alterations, were prepared by the writer for his convenience in the identification of specimens in the field. And while the keys were constructed primarily as aids in identifying the species known to inhabit the immediate valley of the Orinoco, there are frequently included the necessary "characters" distinguishing many species known to be found in contiguous territory. It must be understood, however, that no effort has been made to supply "keys" to the birds of other regions of northern South America.

The nomenclature and determination of species is much the same as that employed by Berlepsch and Hartert in their paper which was based chiefly on the collection made in the same region by Mrs. Cherrie and myself in 1897 to 1899, and the André and Klages collections from the Caura River district.

The references to Berlepsch and Hartert, unless specifically noted to the contrary, are to their paper, and the nomenclature where not otherwise indicated is the same.

TURDIDAE—THE THRUSHES.

Six thrushes are found on the Orinoco: five are resident forms of the genus *Planesticus* and one a North American migrant of the genus *Hylocichla*. The latter is probably never found in juvenal plumage

¹Novitates Zoologicae IX, 1902, p. 131.

on the Orinoco, consequently the character of having the breast spotted will serve to distinguish *Hylocichla* from adult examples of *Planesticus* among birds seen or taken in the Orinoco region.

KEY TO THE GENERA, SPECIES AND SUBSPECIES OF TURDIDAE.

- a. None of the primaries sinuated on the outer webs. *Catharus*.¹
- a'. Some of the primaries sinuated on the outer webs.
- b. Not more than three primaries sinuated on the outer webs. *Hylocichla aliciae aliciae*.
- b'. Four primaries sinuated on the outer webs. *Planesticus*.
- c. Skin about eye bare (in life bright citron yellow) *Planesticus gymnophthalmus*
- c'. Skin about eye feathered.
- d. A white patch below the blackish or dusky streaks on the throat.
- e. Above a rich olive brown strongly washed with rufous. *Planesticus phaeopygus*
phaeopygus
- e'. Above rich olive brown with greenish wash. *Planesticus phaeopygus*
phaeopygoides.
- d'. No white patch below the streaks on the throat.
- e. General color above a subdued olive brown, below greyish brown. *Planesticus albipenter*.
- e'. General color above tawny olive brown, below ochraceous brown. *Planesticus fumigatus*.

PLANESTICUS GYMNOPHTHALMUS (Cabanis).

Turdus gymnophthalmus Cab. in Schomb. Reise Brit. Guiana III. 1848. p. 665; Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 2.

Retiring and shy, frequenting clumps of trees and thickets in the open savanna, and the underbrush near the borders of large timber. It has a pleasing song, and call and alarm notes that somewhat resemble those of the American Robin. Insects and fruits are included in the diet and obtained chiefly from among the branches as I rarely saw this thrush on the ground. The common native name for this and the following species is "Paraulata Montañera." They are occasionally kept as cage birds and become exceedingly tame.

In life the eye is chestnut, the bare skin about eye citron yellow; bill dusky olive buff with pale cutting edges; feet smoke grey. A male bird taken at Maipures above the first falls on the Orinoco, had the bare skin about eye ochre yellow and the eyelids orange-rufous.

Nesting begins with the approach of the rainy season—in the vicinity of Caicara, early in May—and continues until the end of June. A nest taken at Caicara June 9, 1905, (Brooklyn Museum Collection) was loosely placed on the thickly matted horizontal branches of a low shrub, about 1.21 m. from the ground. It was a rather bulky affair with the exterior outlines of a truncated cone, 9 centimeters high, 25 centimeters in diameter at the base and 12 at the top. The bulky

¹The "Orinoco Valley" is taken as type locality (!) for *Catharus birchalli* Seebohm.

part of the nest consists of coarse dead grass, weed stems, rootlets, and a few dead leaves. Then comes the nest cavity built up of rather fine rootlets and dead grasses mixed with mud, with an inner lining of coarse rootlets. The inside of the nest measures 9 cm. in diameter by 4 cm. in depth. Incubation was so far advanced in the two eggs taken with this nest that only one could be saved. The egg is a pale greenish blue rather thickly speckled all over with russet. In addition spots of burnt umber are thickly mixed with the russet about the larger end, and some underlying ecru-drab spots. This egg measures 30×21.5 mm.

Another nest collected at Caicara June 21, 1907, was taken inside the village limits in a courtyard and not over 7 m. from the door of a house where a large family of children were constantly passing back and forth. This nest was about 3.5 m. from the ground at the base of a large horizontal limb of a Guava tree. It resembled the first in all essential features. The dimensions of this nest are: outside, depth 7 cm., diameter at rim 11.5 cm.; inside depth 4 cm., diameter 8.2 cm. The outlines of this nest are not as symmetrical as the one in the previous description. Incubation had begun in the three eggs taken with this nest. The eggs themselves are smaller than the one previously described and are more typically ovate in form; they measure 29×19 ; 27.5×19.5 and 28.5×19.5 mm. respectively. The greenish blue ground color is less clear, and in two of the set the markings are much larger, and more thickly speckled over the surface, especially about the larger end; in the last of the set the specks and spots are nearly uniformly distributed over the entire surface.

In yet another set of three eggs, collected on the 20th of June, the pattern of coloration differs considerably from those described above. In one of the three the greenish blue ground color has a yellowish or buff wash; the irregular small spots and dots of color are larger all over the surface and very thickly massed about the larger end. In the other two eggs the ground color is the same pale greenish blue but the markings are confined entirely to the larger end. In one egg these form a chestnut cap, the edges of which are broken into spots and dots of chestnut overlying rufous. In the last egg the spots and blotches of chestnut overlying others of rufous form a broad band about the larger end. These eggs measure $27. \times 19.5$; 28.75×20.2 ; 28.5×20 mm., respectively.

The nest from which these eggs were taken and from which the

parent bird was flushed, was located about 3.5 m. up amid the thick branches of a small tree standing in a thicket on the edge of the savanna. When discovered there was over half an inch of water in the bottom of the nest, the mud that had been used in its construction having been so firmly packed and mixed with the grasses and other nesting materials that after a heavy rain the water escaped through very slowly.

My observations indicated that the number of eggs in a set varies from two to four; the latter number is, however, unusual.

Specimens of the Bare-eyed Thrush from Trinidad, together with one example from the delta region of the Orinoco, are uniformly richer, less greyish olive above than examples from the middle Orinoco, and there appears to be a greater amount of white on the lower breast and abdomen. It seems not improbable that the examination of a large series would justify the subspecific separation of the two forms.

PLANESTICUS ALBIVENTER (Spix).

Turdus albiventer Spix. Av. Bras. I. 1824. p. 70; Berlepsch & Hartert p. 2.

Specimens were collected on the Orinoco at various points, including Ciudad Bolivar, Alta gracia, Caicara, Quiribana de Caicara, Urbana and Maipures, from the delta region at Las Barrancas upward, as far as the mouth of the Vichada River.

In life the eye is vandyke brown; bill mouse grey with yellowish cutting edges; feet smoke grey.

Spix's Thrush, like the preceding species, frequents dense thickets and is shy and retiring. In many of its actions this bird resembles the American Robin but is usually conspicuous by its absence about the houses, both in the country and in the villages. The nesting habits and nests are similar to those of *T. gymnophthalmus*. A nest taken at Caicara, June 14, 1904, was found in a dense thicket, in the forks of a small sapling, 1.52 m. from the ground. This nest contained three eggs, only one of which was preserved, owing to the advanced state of incubation. This egg is a pale bluish green thickly marked with blotches and spots varying in color from cinnamon-rufous to chestnut overlying pale ecru-drab blotches; it is ovate in form and measures 20 x 28 mm.

Three fresh eggs and a nest were taken at Caicara, June 6, 1905. This nest was only about 1.2 m. from the ground in the forks of a sapling. These eggs have the same ground color as that described above, but two of them are so thickly marked with small spots and specks of rufous and chestnut as to remind one of eggs of the Brown Thrasher (*Toxostoma rufum*). The remaining egg is marked less thickly and with larger spots of varying shades of color from rufous to chestnut overlying pale ecru-drab spotting. The eggs are all ovate. They measure 26 x 20 mm.; 27 x 21 mm. and 28 x 21 mm.

Another nest collected on May 22nd, at Caicara is rather unusual, being less bulky than is the rule, and constructed almost entirely of the long fine rootlets that spring from about the trunks and larger branches of some of the trees of the genus *Ficus*. Only a very little mud is used in the structure. There is a lining of larger rootlets as in the ordinary nest. The inside measurements of the nest are 8.5 cm. in diameter by 4 cm. in depth. The three eggs taken with this nest, as is the case with those described above, show much individual variation. They average smaller, measuring 19 x 24; 19 x 25 and 18 x 23.5 mm.

A nest with four fresh eggs (No. 145; Brooklyn Museum Collection) collected at Agua Salada de Ciudad Bolivar, April 15, 1907, was unusual in that no mud had been employed in its construction. It was located in a niche, 2.4 m. up, in the side of a huge boulder that was surrounded by low trees and tangled bushes of the savanna. That mud had not been used in the building of this nest was probably due to the fact that it could not have been obtained within a distance of less than two miles: the dry season was at its height, and the savanna on all sides was parched and dry. This nest was placed so closely against the wall of rock that at its back only the thickness of the inner lining of rootlets intervened between them. Parallel with the face of the rock the base of the nest measured 24 cm.: at right angles to the face 18 cm.: the outside depth was 7.5 cm. The nest cavity measures 9 cm. diameter by 4.5 cm. in depth,—almost a perfect hemisphere. The body of the nest is made up of very fine bits of grass and plant stems, strips of soft inner bark, dead leaves, etc. Of the four eggs taken with this nest two are thickly marked with small spots and specks (chiefly pale rufous) nearly evenly distributed over the entire surface. The other two are marked with much larger

spots and blotches of various shades of brown, from rufous to chestnut; in one, nearly uniformly distributed, in the other thickest about the larger end. They are ovate in form and measure 28.25×20 ; 28.75×19 ; 26.5×19 and 27.75×20 mm. respectively. The eggs of *P. albiventer* cannot be distinguished from those of its congener *P. gymnophthalmus*.

PLANESTICUS FUMIGATUS (Lichtenstein).

Turdus fumigatus Licht., Verz. Doubl. 1823. p. 38; Berlepsch & Hartert p. 3.

The marked variation in color presented by a series of these thrushes from various localities throughout northern South America has been already commented on by ornithologists. The series before the writer is entirely too small and too meagre in localities represented, to give any satisfactory idea of the geographical distribution of the three or four races into which it seems the species might be separable. Indeed, the distribution indicated by the material at hand is most perplexing.

The writer has met with this thrush on the upper Orinoco, above the falls of Atures and those of Maipures, and in Trinidad. At the present time he has for comparison, specimens from Trinidad, British Guiana, El Pilar on the north coast of Venezuela, Nericagua on the upper Orinoco, Cayenne, and three points in Brazil, viz., Santarem, Diamantina and Maranhao.

From the upper Orinoco region (Nericagua) only one bird is available for comparison. It is a female, taken April 23rd, and agrees almost exactly in color with an example from Santarem, Brazil (without sex or other data), but is decidedly smaller, the wing measuring only 105 mm. and the tail 95, while in the Brazilian specimen the wing measures 118 mm. and the tail 110 mm.

The specimens from Trinidad are uniformly much lighter in color than those from the other localities in the series before me, being a raw umber, with a pronounced olive wash and with a narrow russet edging to the outer edges of the quills, greater, and middle wing coverts. The Nericagua and Santarem birds are dark mummy brown above with a wash of vandyke, while the tips and outer edges of greater and middle coverts are cinnamon-rufous in the Nericagua example (a characteristic which may be due to immaturity). The

Trinidad birds are so different that I have recently separated them as *P. fumigatus aquilonalis*.¹

PLANESTICUS PHAEOPYGUS PHAEOPYGUS (Cabanis).

Turdus phaeopygus Cab. in Schomb. Reise Brit. Guiana II. 1848. p. 666; Berlepsch & Hartert p. 3.

Collected on the Caura River² by Klages (Mountains west of Suapure) and by André (La Pricion). It is replaced in the delta region of the Orinoco by the Tobagan subspecies. (*P. p. phaeopygoides*.)

PLANESTICUS PHAEOPYGUS PHAEOPYGOIDES (Seebohm).

Turdus phaeopygoides Seebohm, Cat. Birds Brit. Mus. V. 1881. p. 404 (Tobago).

Turdus phaeopygus phaeopygoides Hellmayr, Novit. Zool. XIII, 1906. p. 4 (Guanoco, Orinoco Delta).

Hellmayr in preparing his paper on the birds of Trinidad records a specimen from Guanoco in the Orinoco delta, collected by André.

HYLOCICHLA ALICIAE ALICIAE (Baird).

Turdus aliciae Baird, Rep. Pacific R. R. Surv. IX. 1858. p. 217; Berlepsch & Hartert p. 3.

On my first expedition to the Orinoco the Grey-cheeked Thrush was observed at irregular intervals from December until the middle of April. Specimens were collected at Quiribana de Caicara and at Maipures above the falls. Only solitary birds were seen. None have been observed on the more recent expeditions.

MIMIDAE—THE MOCKING BIRDS.

This family is represented in the Orinoco region by a single subspecies of the genus *Mimus* and one species of the genus *Donacobius*.

KEY TO THE GENERA OF MIMIDAE.

- | | |
|---|-------------------|
| 1. No marked streak on side of neck; tail straight; throat less than one-fourth of length of bill. | <i>Mimus</i> |
| 2. Yellow back; streak on side of neck; tail curved; throat more than one-fourth of length of bill. | <i>Donacobius</i> |

MIMUS GILVUS MELANOPTERUS Lawrence.

Mimus melanopterus Lawr., Ann. Lyc. Nat. Hist. N. Y., 1849. p. 35.

Mimus gilvus melanopterus Berlepsch & Hartert, p. 3.

¹Sci. Bull. Mus. Bklyn. Inst. I. 1909. p. 387.

²The Caura is a tributary of the Orinoco entering from the right side, and draining a considerable portion of the mountainous region between British Guiana and Venezuela.

³Ridgway Birds of North and Middle America, IV. 1907. p. 183.

Native name *Paraulata*. Common everywhere on the savannas, frequenting the small clumps of trees and more open thickets. The habits are similar to those of our own mocking-bird, although it is perhaps less shy. Nests are frequently built in the immediate vicinity of the native ranch houses.

At San Mateo de Caicara on May 22, 1905, three fresh eggs were taken from a nest, found in a small tree, about 1.5 m. from the ground. The tree stood alone, close to a house and the nest was in plain view from all sides. The eggs are marked with reddish brown spots, which in two of them were so thickly set as to nearly obscure the pale bluish green ground color. The third egg is rather sparsely spotted, except about the larger end, and the color of the spots is darker, while the ground is a richer bluish green. The eggs are ovate in form and measure 25.5×19.75 ; 26.2×19.75 and 25.5×19.5 mm. Four days elapsed after the completion of the nest before any eggs were laid, then one egg was deposited every twenty-four hours.

A nest taken by the writer at Quiribana de Caicara, April 21, 1898, was found in a low bush at the edge of the open savanna about 91.5 cm. from the ground. It was constructed of coarse dry sticks lined with dry grasses and rootlets. The eggs taken with this nest measure " 27×19.5 ; 25.6×19.5 ; and 25.6×19.8 mm."

Another nest found May 25, 1898, was in a dense clump of thorny bushes at the edge of the open savanna. This nest was only 61 cm. from the ground.

At Caicara on the 6th day of May, 1907, a nest with three eggs was taken that was similarly placed to that of the last, only about 61 cm. up in a thicket of thorny palm stems. Incubation had begun, and was much further advanced in one egg than in the other two. The eggs measure 27.4×19.5 ; $27.5 \times 20.$ and 27.75×19 mm. Compared with the set first described the markings are somewhat darker and in larger spots. In the smallest of the three eggs the markings are uniformly distributed over the entire surface and very thickly set. In the largest egg the markings are lightest in color, fewest in number and clustered most about the larger end.

Eggs of the Colombia Mocking-bird are indistinguishable from those of either *Planesticus albiventer* or *P. gymnophthalmus*.

A male in juvenal plumage taken at Caicara, June 2, 1905, has a greyish eye and dusky bill and feet. It is smoke grey above, clear on

¹Berlepsch & Hartert, p. 3.

the head and mottled with a wash of wood brown. The wings and tail are black, tips and outer edges of primaries and alula white. Tertiaries, secondaries and coverts are tipped and edged with pale buffy wood brown. Outer edges of outer pair and tips of five outer rectrices white. Below dull white washed with buff and spotted with dusky brown except on crissum and belly. Postocular and malar streaks and auriculars grayish white. Lores and subocular streak blackish. A faintly indicated dusky sub-malar streak.

DONACOBIVS ATRICAPILLUS ATRICAPILLUS (Linnaeus).

Turdus atricapillus Linn., Syst. Nat: ed. 12. I. 1766. p. 295. ("Cap Bon Spei"—Berlepsch & Hartert substitute E. Brazil.)

Donacobius atricapillus Berlepsch & Hartert, p. 4.

Klages sent a specimen that he collected on the Mato River, one of the small tributaries of the Caura River, to the Tring Museum: and Mr. Beebe collected and noted this species as abundant in the delta at Guanoco.

TROGLODYTIDAE—THE WRENS.

Five genera are represented in the Orinoco region including six species and four subspecies. All are notable as songsters and characteristic birds of the regions that they frequent.

KEY TO GENERA, SPECIES AND SUBSPECIES OF TROGLODYTIDAE.

- | | |
|---|--|
| a. Tail equal to or longer than wing. | <i>Heleodytes</i> . |
| b. Under parts white without spots or markings. | |
| c. Upper parts greyish brown with scarcely a trace of umber, smaller... | <i>H. griseus</i> . |
| c'. Upper parts strongly raw umber brown or washed with brown (between a raw umber and mummy), larger..... | <i>H. minor</i> . |
| b'. Under parts white with breast, sides, flanks and under tail-coverts spotted with blackish..... | <i>H. nuchalis</i> . |
| a'. Tail shorter than wing. | |
| b. Chin and throat pale and without dusky or blackish cross bars. | |
| c. Feathers on sides of neck mottled black and white, the centres being white, edges black..... | <i>Leucolepis musicus</i> . ¹ |
| c'. Feathers on sides of neck not black and white mottled. | |
| d. Nostrils rounded, at forward end of the nasal fossa..... | <i>Thryophilus</i> . |
| e. Throat white, remainder of under parts buff, on sides, flanks and under tail-coverts becoming ochraceous. (On the Caura River, the Cuchivero River and probably other tributaries of the Orinoco, entering that stream from the Guiana side) | <i>T. albipectus albipectus</i> . |

¹This wren so far as known is found only in British Guiana, but it is not improbable that it may be taken in the delta region of the Orinoco.

- c'. Much paler below, the brownish-olive color being confined almost entirely to the flanks and under tail-coverts; upper surface also paler with less rufous. (Middle stretches of the Orinoco from the delta region—Las Barrancas—up as far as the first Falls, Atures)..... *T. albipectus hypoleucus*.
- e'. Entire upper parts much darker rufous brown, below, sides, flanks and crissum deep ochraceous, very much richer in color than either of the preceding forms. (The Upper Orinoco from above the Falls of Atures)..... *T. albipectus bogotensis*.
- d'. Nostrils, if rounded, *not* at forward end of nasal fossa.
- e. Nostrils linear, opening along lower edge of nasal fossa.
- f. Throat white, breast grey..... *Phengopedius grisepectus cauensis*.
- f. Throat and breast buffy..... *Troglodytes musculus clarus*.
- e'. Nostrils rounded, near center of nasal fossa.
- f. Prominent white wing-bands formed by subterminal white tips to greater wing-coverts..... *Microcerculus cauensis*.
- f'. No wing-bands..... *Henicorhina leucosticta*.

HELEODYTES GRISEUS (Swainson).¹

Furnarius griseus Swains., Anim. in Menag. 1838. p. 325.

Campylorhynchus griseus Berlepsch & Hartert, p. 4.

Native name *Cucarachero*. In life the eye is vandyke brown; bill black above, greyish horn color below; feet slate color.

Birds of this species are usually seen (and heard) in pairs, or, after the breeding season, from April to July, in family parties of from three to eight. They are rarely seen in the dense forest, keeping near the borders of open savannas and localities abounding with scattering scrub oaks and clumps of underbrush.

The nesting habits of this species are quite unusual. Early in my acquaintance with it I had believed it constructed its own nests, but that the nests built one year were not employed,—at least not for the rearing of a brood of young,—until the following season. Later observations have convinced me, however, that rarely, if ever, does this wren do more in the way of nest building than to refurnish the abandoned nest of some other bird, and that the more dilapidated the structure is in outward appearance, the more acceptable it is as a true nesting site. The old abandoned nests of *Pitangus sulphuratus* are the ones that appear to be selected most frequently. Several of these nests together with nests of *Myiozetetes* are frequently found in the same tree, often within three or four feet of one another, and if one of the *Pitangus* nests is the real nest of a pair of wrens the owners may be seen entering the other old nests quite as frequently as they do their

¹Berlepsch & Hartert, p. 4, have called attention to the error in the British Museum Catalogue regarding this species and *bicolor*, the names having been transposed.

own. Not only do they enter the other nests but they may be seen industriously carrying in nesting material. This curious habit, I have observed, is indulged in chiefly when the birds are being watched,—when they feel their homes may be in danger. While nesting materials, such as soft dry grasses, may be carried into any and all of the old nests in the tree where a Large Cactus Wren is nesting, only one nest will receive a lining of the soft down-like substance that envelops the seed of the silk-cotton tree, and there the eggs or young will be found. I never ascertained that more than one pair of birds nested in a single tree, but found from three to eight nests in a tree occupied by a single pair of birds.

I first took eggs of this species at Quiribana de Caicara, April 10, 1898. The clutch contained only three eggs in which incubation was far advanced. The nest was an old one, doubtless that of *Pitangus sulphuratus rufipennis* with a fresh lining. It was a large globular affair composed of dry grasses, set in a tangle of small limbs of a scrub oak, about 3.5 m. from the ground. The entrance was at one side near the top. In the same tree were six other nests, none of which were occupied and there was apparently only the one pair of birds in the neighborhood.

Another clutch of three eggs with incubation far advanced was taken April 17th. The nest was about 4.5 m. up in a scrub oak, that stood well out in the savanna. It was an old nest, globular in form, ragged and dilapidated in appearance, but it had been supplied with a little fresh lining of soft grasses. A new nest of *Pitangus* had been built in the same tree, not ten feet from the old one, but had been deserted by the original owners and the wrens had selected the old one in preference.

A clutch of five incubated eggs of this species (now in the Tring Museum), was taken at Caicara, June 27, 1898. They were of a "glossy brownish brick-red, darker spots being traceable."¹ Others are "whitish red, the brick-red patches leaving some of the ground color free."¹ They measure "24.5 x 18.5; 24.5 x 17.4; 24 x 17.5 mm."¹ The nest in this case was as usual an old one and much dilapidated. It was situated about 2.4 m. up in a small scrub oak. There was a much newer nest in the same tree not over 1.2 m. from the one containing the eggs. Both birds were present and manifested much concern, scolding me soundly. Before I climbed the tree to search

¹Harpagofides & Hartert, p. 1.

for eggs I watched the parents for some time and noted them frequently entering and leaving the new nest but not approaching the old one in which were the eggs. While I was taking the clutch of eggs on April 17th the parent birds remained close by but seemed to take little notice of my presence.

A nest which together with a set of four eggs and the parent birds was taken at Caicara May 5th, 1907 (No. 14,655 Geo. K. Cherrie Coll.) was a nest of *Pitangus sulphuratus rufipennis* that, having served as a home for a brood of its builders' young, had been abandoned by that builder and appropriated by a Cactus Wren. A new lining of coarse dry grasses only had been taken in. The nest was located at the extreme end of a long horizontal branch of a *Guaramal* tree and was about 2.4 m. above the ground. The parent birds, both of which were collected, were not at all demonstrative. The female was shot as she left the nest. The ground color of the eggs varies from a salmon-buff to a vinaceous-cinnamon. They are everywhere thickly speckled with hazel and chestnut. Of the four eggs, one was on the point of hatching, one about half incubated, one fresh, the fourth rotten and pierced with two small holes on the larger end. They measure 24×17.5 ; 23×17.5 ; 23.5×17.75 and 24.5×16.5 mm. respectively. Three are ovate in form and one decidedly elongate ovate.

On the 22nd of May, 1907, near La Cascabel on the River San Feliz, a nest was found containing two half grown young and one rotten egg. The nest was undoubtedly one that had been built by a *Pitangus*. It was about 4.5 m. from the ground. The egg is ovate in form and measures 25×18 mm. In color the ground is nearly a salmon-buff and is thickly speckled with vinaceous-cinnamon. Mr. Hartert in describing the eggs sent by the writer to the Tring Museum refers to them as "glossy," but that term would hardly be applicable to the examples that are before me.

HELEODYTES MINOR Cabanis.¹

Heleodytes minor Cab., Mus. Hein. I. 1851. p. 80.

This species was collected at Ciudad Bolivar by Klages, and the

¹In the American Museum collection is a series of specimens from the Santa Marta region, Colombia, identified by Allen as *Heleodytes swainsoni* (Bull. Am. Mus. Nat. Hist., N.H. 1900, p. 180) that seem to belong to this species, but doubtless represent a different race that differs from the Venezuelan birds by the almost total lack of barring to the tail-feathers (being faintly indicated in three or four only), and in the greater extent and deeper shade of chestnut red on the back, rump, and wing-quill edges.

writer secured a single example at Agua Salada de Ciudad Bolivar on the 1907 expedition. There is also in the American Museum collection a small series of specimens collected by Klages from Maripa, in the Caura River region.

HELEODYTES NUCHALIS (Cabanis).

Campylorhynchus nuchalis Cab., Orn. Not. in Arch. Naturg. XIII. 1847. p. 206; Berlepsch & Hartert, p. 5.

An abundant species along the middle Orinoco. Specimens were collected at Altagracia, Caicara and Quiribana de Caicara. It frequents similar localities to those where *H. griseus* is found and may be usually seen in pairs or family parties.

In fresh specimens the colors are: eye straw yellow; feet slate grey; bill above dusky, below pale flesh color.

The nesting habits of this species are somewhat similar to those of *H. griseus*, and equally interesting. A nest containing four fresh eggs was found at Caicara, May 12, 1907 (No. 14,737 Cherrie Coll.). It was one of half a dozen irregular shapeless masses of fine soft root-lets, grasses, feathers and tufts of the soft silky down from fruits of the silk-cotton (*balsamo*) tree. Each of the nests, apparently masses of rubbish, was provided with two or three entrances to as many chambers, or instead of opening into separate chambers they were in some cases entrances to tunnels through the nest mass! Only one of the several nest masses, however, was in use as a nest proper. That contained four fresh eggs. To the nest cavity proper there was only one entrance, but in addition there were in the same nest mass two tunnels running from side to side. At the time when the eggs were secured both parent birds were present and showed the greatest excitement. Their actions were most extraordinary, and instead of employing their time with cries of distress, or scolding the intruder, they immediately went to work, industriously carrying mouthfuls of soft feathers and *balsamo* from one nest mass to another, but not going near the real nest. However, when they realized that the enemy could not be deceived by their artifice, they turned their attention to the nest mass containing the eggs, and worked with such a will, and with such good effect, packing the entrance with *balsamo* and soft feathers, even while I was engaged in cutting the branch that supported the nest, that by the time the nest was on the ground no entrance was visible. For a moment I was inclined to believe I had made a mistake.

I believe the nests of this wren, like those of *H. griseus* always have as a foundation the abandoned, and frequently half-decayed nests of either *Pitangus* or some species of *Myiozetetes*.

The eggs are elongated-ovate in shape and a delicate pure white in color.

HENICORHINA LEUCOSTICTA (Cabanis).

Cyphorhinus leucostictus Cab., Orn. Not. in Arch. Naturg. XIII. 1847. p. 206.

Henicorhina leucosticta Berlepsch & Hartert, p. 5.

André collected specimens of this wren on the Caura River.

MICROCERCULUS CAURENSIS Berlepsch & Hartert.

Microcerculus caurensis Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 5.

A single specimen of this wren, said by its describers to be "closely allied to *M. bambla* from Guiana" was collected by André at Nicare on the Caura River.

THRYOPHILUS ALBIPECTUS ALBIPECTUS Cabanis.

Thryophilus albipectus Cab. in Schomb. Reise Brit. Guiana, III. 1848. p. 673 (Cayenne); Berlepsch & Hartert, p. 6 (Saupure, La Pricion, La Union and Nicare, Caura River).

In the Brooklyn Museum collection and that of the American Museum of Natural History, the writer has had for study Venezuelan specimens from localities in the Orinoco region as follows:—On the Orinoco proper: Nericagua, Munduapo, Caicara, Ciudad Bolivar, Agua Salada de Ciudad Bolivar and Las Barrancas; La Cascabel (on the River San Feliz near its junction with the River Cuchivero); Mato River (near its junction with the Caura River); Maripa and La Union on the Caura River. Typical examples of three forms are represented, together with specimens that are intermediate in character.

Specimens collected by the writer at "La Cascabel" compared with an example of typical *albipectus* from Cayenne (No. 668 Cherrie and Gault Coll.) in the American Museum collection, agree almost exactly in color both above and below, but lack the faint traces of dusky bars on the back that are to be seen in that specimen. The American Museum series from Maripa and a single example among those labeled "La Union" (Klages Coll.) are referable to this form. Typical examples have been also recorded from Saupure, La Pricion,

La Union and Nicare on the Caura River. The Brooklyn Museum specimens from Las Barrancas (Orinoco Delta region) are referred to this form but are somewhat intermediate in character between *albipectus albipectus* and *albipectus hypoleucus*.

THRYPHILUS ALBIPECTUS HYPOLEUCUS Berlepsch & Hartert.

Thryophilus albipectus hypoleucus Berlp. & Hart., Bull. B. O. C. XII. 1901. p. 12; Novit. Zool. IX. 1902. 6.

This, the lightest colored form of the white-breasted wren, is found everywhere along the Orinoco from Ciudad Bolivar up as far as, possibly beyond, the mouth of the Meta River. It, in common with the other races of this species, frequents the denser clumps of trees and bushes that dot the edges of savanna regions.

Fresh birds have the eye mummy brown; bill blackish above, slate color below; feet plumbeous.

Specimens were collected at Agua Salada de Ciudad Bolivar, Ciudad Bolivar, Altigracia, Caicara and Quiribana de Caicara. The specimens collected by the writer at Agua Salada de Ciudad Bolivar and at Ciudad Bolivar are somewhat intermediate in character, forming with the Las Barrancas specimens of *albipectus albipectus* links in the evidence pointing to the common origin of the two forms.

THRYPHILUS ALBIPECTUS BOGOTENSIS Hellmayr.

Thryophilus albipectus bogotensis Hellmayr, Verhandl. Zool.-Botan. Gesellsch. Wien, LI. 1901. p. 774. (Type in Berlepsch Museum, Bogota Coll.).

Thryophilus albipectus subsp. Berlepsch & Hartert, p. 6.

This dark race was observed and collected by the writer on the Upper Orinoco at Perico, Maipures, Munduapo and Nericagua. In the American Museum collection there are specimens from La Union (on the Caura River) and from the Mato River collected by S. M. Klages, and two examples from Surinam (Chunkoo Coll.) that, by comparison with specimens collected by the writer at Maipures and Nericagua on the Upper Orinoco, seem to be typical of this race.

In a female from Nericagua there are faint traces of narrow dusky bars on the back. In the female from Surinam such bars are quite evident and they are indicated in both a male and female example from La Union.

PHEUGOPEDIUS GRISEIPECTUS CAURENSIS (Berlepsch & Hartert).

Thryothorus griseipectus caurensis Berlepsch & Hartert, Novit. Zool. IX. 1902, p. 7.

Described from specimens secured on the Caura River by Mr. Eugene André. It has been recorded from La Union, La Pricion and Nicare (type locality).

TROGLODYTES MUSCULUS CLARUS Berlepsch & Hartert.

Troglodytes musculus clarus Berlepsch & Hartert, Novit. Zool. IX. 1902, p. 8. (Type, Bartica Grove, British Guiana.)

Common throughout the Orinoco region at least as far as the Falls of Atures.

Specimens were collected at Ciudad Bolivar, Altagracia, Caicara and Quiribana de Caicara.

In life the eye is seal brown; bill above blackish, below pale grey; feet dusky slate grey.

A set of four slightly incubated eggs, together with the parent birds, were taken at Caicara, July 10, 1906 (15,078 Cherrie Coll.). The eggs are short ovate in form and measure 17.5×14 ; 16.9×13.5 ; 17×13.75 and 17.5×13.6 mm. They are thickly dotted over the entire surface with brown varying in shade on the different examples from vinaceous to chestnut. In two of the eggs the specks and dots are more thickly clustered about the larger end, forming a cap. The ground color is a pale buffy pink. The nest was located in a natural cavity in the trunk of a *Chaparo* oak about 2.1 m. from the ground. Very little nesting material had been taken into the nest cavity, and consisted of a few black hair-like vegetable fibres on top of which was a lining of the wing and tail feathers of small birds so arranged that the quills stuck outward and upward around the edge of the nest, and the soft tips rested on the bottom. Here and there between the feathers were bits of the cast skin of some small lizard.

The parent birds were shy and wary. The female when flushed would fly directly to a thicket some twenty-five yards distant where she would remain quietly in hiding until she believed all danger to have passed.

SYLVIIDAE—THE KINGLETS AND GNATCATCHERS.

Only a single species pertaining to this family was observed on the Orinoco.

Mr. Hellmayr, who has made a careful study of the South American members of the genus *Polioptila*, has, in his last word on the subject¹, concluded that there are six recognizable races of *P. livida*.

Only one of this number has been recorded from the Orinoco region but as there are two others whose geographical distribution when better known may be found to extend to the territory under consideration, I have included them in the following key.

KEY TO SUBSPECIES OF POLIOPTILA LIVIDA.

- a. Outer tail-feathers black at base of both inner and outer webs. *Polioptila livida plumbiceps*.
- a'. Outer tail-feathers entirely white.
- b. Upper wing-coverts edged with whitish and broad white edgings of the tertials reaching almost to the shaft. (Cayenne, Surinam, Lower Amazonia from Para to Santarem) *Polioptila livida livida*.
- b'. Upper wing-coverts edged with pale bluish grey and white edges to tertials much narrower. (British Guiana, Rio Branco in North Brazil) *Polioptila livida innotata*.

POLIOPTILA LIVIDA PLUMBICEPS (Lawrence).

Polioptila plumbiceps Lawrence, Proc. Acad. N. Sc. Phila. XVII. 1865. p. 37 (Venezuela).

Polioptila nigriceps Berlepsch & Hartert (non Baird) p. 9.

P[olioptila] livida plumbiceps Hellmayr, Novit. Zool. XIV. 1907. p. 4.

This species is common along the Middle Orinoco from Ciudad Bolivar to the Falls of Atures, and less abundant above the falls where specimens were collected at Maipures.

A nest of this species, which the young were just leaving, was found at Caicara June 20, 1907. It closely resembled nests of the Blue-grey Gnatcatcher of Eastern North America, being a neat, trim, lichen-covered cup, saddled on to a horizontal branch. The nest measures outside: depth 45, diameter at middle of nest, 55; inside: depth 31; diameter at rim 35; diameter half way down 41 mm. It was about 5 m. from the ground on one of the branches of a *Chaparo* oak that stood near the edge of the open savanna. It is by merest chance that such a nest is discovered as it is so small, so inconspicuous and its lichen covered walls match so exactly the color of the branch on which it rests.²

¹Novitates Zoologicae XIV. 1907. pp. 4-5.

²It seems somewhat doubtful to the writer if the nest described as that of Lawrence's Gnatcatcher by Clark (Auk XIX. 1902. p. 266.) from Margarita Island could have belonged to that species. Gnatcatcher nests certainly do not resemble those of the yellow Warbler.

MNIOTILTIDÆ—THE WARBLERS.

The author has collected seven species of Warblers on the Orinoco, four of which number were North American migrants. One other species (*Basileuterus mesoleucus*) was included in Berlepsch and Hartert's paper and was collected by Klages at Suapure on the Caura River. Now I am able to add *Basileuterus auricapillus olivascens* based on a specimen collected by Mr. C. William Beebe at Guanoco in the delta region and *Oporornis agilis* collected by L. E. Miller at Maipures.

In the following key I have included some other species and subspecies that are recorded from various points in British Guiana that not improbably may be later found to enter the Orinoco valley.

KEY TO THE SPECIES AND SUBSPECIES OF MNIOTILTIDÆ.

- a. Having a distinct superciliary stripe and breast not red.
 - b. Breast and sides streaked with dusky or blackish..... *Seiurus noveboracensis*.
 - b'. No streaks on breast and sides.
 - c. Throat, breast and belly white..... *Basileuterus mesoleucus*.
 - c'. Throat, breast and belly yellow..... *Basileuterus auricapillus*.
- a'. No distinct superciliary stripe; or, if present, then centre of breast and belly vermillion (geranium red).
 - b. Throat white, whitish grey or black, and sides and breast not streaked.
 - c. Centre of breast and belly red, sides and flanks grey..... *Granatellus pelzelni*.
 - c'. Centre of breast and belly not red.
 - d. Centre of breast and belly white or whitish, sides of breast yellowish or reddish pink..... *Setophaga ruticilla*.
 - d'. Belly yellow, throat and upper breast slate grey or pale grayish brown..... *Chondestes*.....
 - b'. Throat yellow, or, sides and flanks streaked with blackish.
 - c. Under tail-coverts of the same general color as other under parts.
 - d. Inner webs of outer tail-feathers marked with yellow or white.
 - e. Under parts white with dusky or blackish streaks on sides..... *Dendroica striata*.
 - e'. Under parts yellow, with or without russet or brownish streaks. *Dendroica aestiva*.
 - d'. No markings on inner webs of outer tail-feathers..... *Geothlypis aequinoctialis*.
 - c'. Under tail-coverts white in sharp contrast to the yellow breast.
 - d. Above slate grey with olive green triangular patch in centre of back..... *Compsothlypis pitayumi elegans*.
 - d'. Above, head yellow shading into olive green on back, rump slate grey..... *Protonotaria citrea*.¹

COMPSOTHTYPIS PITIAYUMI ELEGANS Todd.

Sylvia pitayumi Vieillot, Nouv. Dict. d'Hist. Nat. XI. 1817. p. 276.

Parula pitayumi Berlepsch & Hartert, p. 10.

[*Compsothlypis*] [*pitiayumi*] *pitiayumi* Ridgw. Auk. XIX. 1902. p. 69 in text.

¹Chapman, *Bull. Am. Mus.* VI: 1894: 24, included the Prothonotary Warbler in his list of the birds of Trinidad. Future collecting may discover it in the delta region of the Orinoco.

Compsothlypis pitiayumi elegans Todd Ann. Carnegie Mus. VIII. 1912, p. 204 (Type ♂, Anzoategui, Lara, Venez., in Carnegie Museum).

At Altagracia, midway between Ciudad Bolivar and Caicara, this little warbler was not uncommon during January and February, 1897, and on the 1907 expedition I found it common at Agua Salada de Ciudad Bolivar during April and at Caicara during May.

GRANATELLUS PELZELNI PELZELNI Sclater¹

Granatellus pelzelni Sclater, P. Z. S. 1864. p. 607; Berlepsch & Hartert, p. 10.

G[ranatellus] p[elzelni] pelzelni Hellmayr, Novit. Zool. XIII. 1906. p. 355.

A single specimen of this handsome warbler, an adult female, was captured in the thick forest at Munduapo (above the second falls) in February, 1899. Klages collected it at La Pricion, André at Nicare and La Union on the Caura, and the writer secured a single specimen at La Cascabel, May 26, 1907. In the La Cascabel specimen the eye was dark; bill black above, slate grey below; feet slate grey. It is a male not yet in full plumage, having the entire top of the head slate blue like the back but with the feathers black basally; the feathers on the forehead are tipped with ochraceous; lores, cheeks and streak above eye and ear coverts ochraceous buff flecked with blackish on lores and sides of face; auriculars slate blue with some buffy shaft streaks.

GEOTHYLPIS AEQUINOCTIALIS (Gmelin).

Motacilla acuinotialis Gm., Syst. Nat. I. 1789. p. 972 ("Cayenna").
Geothlypis acuinotialis Berlepsch & Hartert, p. 11.

Many taken at Quiribana de Caicara and at Altagracia in 1897-'98. At the former place it was common in the tall grass and sedges, growing along the low marshy banks of Quiribana Creek, some six or seven miles back from the Orinoco, on the open savanna. When flushed these birds would flutter just above the tops of the grasses for twenty or thirty yards and then drop out of sight. The action was what one would look for in a rail and very unwarbler-like.

¹In Cat. Birds Brit. Mus. X. 1885. p. 369, under the "key to species," Mr. Sharpe erroneously places *G. pelzelni* in a section "having a black pectoral collar," but there is no pectoral collar in specimens I have seen and the white throat is followed immediately by the red breast.

At La Casabel and Las Guacas in 1907 this species was found common in the tall grasses bordering the marshes.

OPORORNIS AGILIS (Wilson).

Sylvia agilis Wilson, Am. Orn., 1812, p. 64 (Connecticut).

There is in the American Museum collection a specimen collected by Miller and Iglseder at Maipures. I believe this to be the first record of the species in the Orinoco valley.

BASILEUTERUS MESOLEUCUS Sclater.

Basileuterus mesoleucus Scl., P. Z. S. 1805, p. 286; Berlepsch & Hartert, p. 11.

Klages sent examples of this species to the Tring Museum that he obtained at Suapure on the Caura River.

BASILEUTERUS AURICAPILLUS OLIVASCENS Chapman.

Basileuterus termicorus olivascens Chapm., Auk, N. 1893, p. 343 (Trinidad).

This is an abundant species in Trinidad and Mr. C. William Beebe secured a good example, in April, at Guanoco in the Orinoco Delta region which agrees exactly with the Brooklyn Museum series from Trinidad.

SETOPHAGA RUTICILLA (Linnaeus).

Motacilla Ruticilla Linn. Syst. Nat. ed. 10. X. 1758. p. 186.

Setophaga ruticilla Berlepsch & Hartert, p. 11.

Not uncommon about Quiribana de Caicara during April, 1898, but observed only during the first week in May on the two recent expeditions.

DENDROICA AESTIVA AESTIVA (Gmelin).

Motacilla aestiva Gm. Syst. Nat. I. 1788. p. 996.

Dendroica aestiva Berlepsch & Hartert, p. 9.

The Yellow Warbler was noted from November 3rd to May 3rd and was not uncommon.

DENDROICA STRIATA (Forster).

Muscicapa striata Forster, Phil. Trans. LXXII. 1772. p. 406.

Dendroica striata Berlepsch & Hartert, p. 9.

Only four species of North American warblers are found in the valley of the Orinoco, the Black-poll, Yellow Warbler, Redstart, and the "Water-Thrush." The Yellow Warbler and Black-poll are not uncommon from October to early May. The "Water-Thrush" is found during the same months but is much less common. Redstarts I only observed during April and the first week in May.

SEIURUS NOVEBORACENSIS NOVEBORACENSIS (Gmelin).

Motacilla noveboracensis Gm. Syst. Nat. 1788. p. 958.

Seiurus noveboracensis Berlepsch & Hartert, p. 10.

Not uncommon. The sight of a "Water-Thrush" daintily bowing from left to right as he wandered along the shore of some stream or pond was as cheering as seeing the face of an old friend from home.

VIREONIDAE—THE VIREOS, PACHYSYLVIAS AND PEPPER-SHRIKES.

Some eight or nine members of this family are to be found in the Orinoco Region, but of this number the writer has collected only four. Berlepsch and Hartert in their paper include seven species of which they had specimens. I am now able to add *Pachysylvia aurantiifrons saturata* of the northern coast of Venezuela and Trinidad, based on specimens from the delta while *P. brunneiceps*, *P. hypoxantha*, *P. semicincta* *Vireosylva calidris calidris* and *Vireosylva olivacea* enter the region from the upper Orinoco.

KEY TO THE SPECIES AND SUBSPECIES OF VIREONIDAE.

- a. Outermost primary (tenth) obsolete, and wing rather long and pointed.
 - b. With a dusky or blackish submalar streak *Vireosylva calidris calidris*.
 - b'. Without dusky or blackish submalar streak.
 - c. Sides and flanks strongly washed with olive yellow, under tail-coverts sulphur yellow, wing less than 75 *Vireosylva chivi agilis*.
 - c'. Sides and flanks only faintly washed with olive yellow, under tail-coverts pale yellowish or white, wing more than 75 *Vireosylva olivacea*.
- a'. Outermost primary (tenth) about half as long as the ninth, and wing short and rounded.
 - b. Bill slender and but slightly decurved terminally; wing less than 65 mm. long.
 - c. A distinct olive yellow jugular band *Pachysylvia thoracicus griseiventris*.
 - c'. Without olive yellow jugular band.
 - d. General color of under parts yellow *Pachysylvia aurantiifrons saturata*.
 - d'. General color below not yellow.
 - e. Forehead, crown and tail strongly rufous *Pachysylvia ferrugineifrons*.
 - e'. No rufous on tail.
 - f. General color of under parts buffy brownish *Pachysylvia flavipes acuticauda*.

- f'. Under parts not buffy brownish.
- g. Crown and nape grey in sharp contrast with olive green back. *Pachysylvia muscipina*
- g'. Crown and nape not grey in sharp contrast with color of back.
- h. Under tail-coverts greyish white, uniform with centre of abdomen. *Pachysylvia thoracicus semimerula*
- h'. Under tail-coverts pale yellow in contrast with greyish white of centre of abdomen. *Pachysylvia brunneiceps*
- b'. Bill stout and strongly decurved terminally; wing more than 70 mm. in length.
- c. Throat and fore neck orange-yellow, rest of under parts washed with green. *Vireolanus leucotis chlorogaster*
- c'. Throat and breast lemon or greenish yellow, rest of under parts white or pale buffy white. *Cyclarhis gujanensis flavipectus*

VIREOSYLVA CALIDRIS CALIDRIS (Linnaeus).

[*Motacilla*] *calidris* Linnaeus, Syst. Nat., ed. 10, 1758, p. 184 (Jamaica).

In the American Museum collection is a specimen collected at Boca de Sina, Rio Cunucunuma, Upper Orinoco, by Miller and Iglseder. This species has not previously been recorded from the Orinoco.

VIREOSYLVA CHIVI AGILIS (Lichtenstein).

Sylvia chivi Vieill. Nov. Dict. d'Hist. Nat. XI. 1817, p. 174.

Lanius agilis Lichtenstein, Verz. Doubl. 1823, p. 526.

Vireo chivi Berlepsch & Hartert, p. 13.

Common. A nest containing young was found June 8th, and on June 24 many young were seen. The nest is much like that of the common *V. olivacea* of Eastern North America, suspended between the slender twigs of a small branch, about 2.5 m. from the ground, and measures: outside depth 4.5 cm. inside depth 3.5 cm.; outside diameter about 5.5 cm., inside diameter about 4.5 cm. at the rim, which is slightly contracted. The general outlines of the nest are somewhat irregular, as it conforms more or less to the triangular supports from which it is suspended. The nest walls are frail and composed of soft dry grasses over which there is a veneer of half decayed leaves held in place by spider webs; there is no inner lining.

In my series from the Orinoco there are quite as many birds of this species having the bill blackish as there are those that have the bill brownish horn-color, and there is no appreciable difference in size between them and birds from the island of Trinidad.¹

¹This is entirely at variance with Mr. Hellmayr's conclusions, based on the series in the Tring Museum. Novit. Zool. XIII. 1906, p. 11.

VIREOSYLVA OLIVACEA (Linnaeus).

[*Muscicapa*] *olivacea* Linnaeus Syst. Nat., ed. 12, 1766, p. 327.

This species has not been observed by the writer, but Miller and Iglseider sent to the American Museum two examples from Boca de Sina, Rio Cunucunuma, Upper Orinoco.

PACHYSYLVA THORACICA GRISEIVENTRIS (Berlepsch & Hartert).

Hylophilus thoracicus griseiventris Berlepsch & Hartert. Novit. Zool. XI. 1902, p. 11.

Klages collected the type (male) and a female at Suapure on the Caura River in November, 1899. They were sent to the Tring Museum, as was also a male specimen collected by André at La Pricion on the Caura. The writer did not find this species on the Orinoco proper.

PACHYSYLVA AURANTIIFRONS SATURATA Hellmayr.

Pachysylvia aurantiifrons saturata Hellmayr, Novit. Zool. XIII. 1906, p. 12 (Type, San Antonio, Cumana, Venezuela).

Mr. C. W. Beebe collected specimens of this *Pachysylvia* at Guanoco which agree exactly with Trinidad skins.

PACHYSYLVA FERRUGINEIFRONS (Sclater).

Hylophilus ferrugineifrons Sclater, P. Z. S. 1862, p. 110; Berlepsch & Hartert, p. 12.

In the heavily wooded regions above the falls of the Orinoco this species replaces the abundant *P. flavipes acuticauda* of the middle and lower stretches of the river. Except during the nesting season it associates in small flocks or family parties which frequently join the mixed companies of birds that are so characteristic of tropical forests. This species was also collected on the Caura River at Suapure (Klages) and Nicare and La Pricion (André).

PACHYSYLVA FLAVIPES ACUTICAUDA (Lawrence).

Hylophilus acuticauda Lawr., Proc. Acad. Nat. Sci. Phila. XVII. 1865, p. 37.

Hylophilus flavipes acuticauda Berlepsch & Hartert, p. 12.

Common at Ciudad Bolivar and Caicara.

All specimens procured indicated that the species was brooding in May and June, but I did not succeed in finding either nest or eggs.

In life the eye is drab grey: bill dusky above, pale below; feet pale flesh color.

PACHYSYLVA MUSCICAPINA MUSCICAPINA (Sclater & Salvin).

Hylophilus muscicapinus Sclater & Salvin, Nomencl. Av. Neotr. 1873, p. 156; Berlepsch & Hartert, p. 12.

This is another species taken on the Caura River by both André and Klages but one that I did not see on the Orinoco proper. Miller and Igleseder have recently taken examples at the foot of Mount Duida.

PACHYSYLVA THORACICUS SEMICINEREA (Sclater & Salvin).

Hylophilus semicinereus Sclater & Salvin, P. Z. S. 1867, p. 570 (Para).

In the Miller and Igleseder collection made near the foot of Mount Duida, Upper Orinoco (Am. Mus. collection), is a single specimen that probably pertains to this race.

This specimen, an apparently adult female, taken Mch. 31st, is *dark citron* green above, the feathers of the crown and nape showing much slate grey basally and centrally (the feathers of the nape and crown might be said to be slate grey heavily bordered with the color of the back): ear-coverts pale brownish drab. Below grey, dark neutral grey on throat and upper breast, pale neutral grey on sides and flanks, centre of breast, abdomen and under tail-coverts very pale grey; sides of neck, throat and breast washed lightly with color of back throat and upper breast faintly washed with buffy. Axillaries, under wing-coverts and narrow inner edges of wing-quills lemon yellow. Wing 56 mm., tail 45 mm.

There is no indication of the olive green jugular band of *P. m. muscicapina*.

PACHYSYLVA BRUNNEICEPS (Sclater).

Hylophilus brunneiceps Scl. P. Z. S. 1866: p. 322 (Barcellos, Rio Negro).

The American Museum collection also contains an example of this rare vireo from San Fernando de Atabapo, Upper Orinoco, collected by Miller and Igleseder.

VIREOLANIUS LEUCOTIS CHLOROGASTER Bonaparte.

Vireolanius chlorogaster Bonap., Compt. Rendus, XXXVIII. 1854. p. 381.

Vireolanius leucotis chlorogaster Berlepsch & Hartert, p. 13.

A single specimen collected by Mr. Klages at Suapure on the Caura River (*l. c.*) was sent to the Tring Museum.

CYCLARHIS GUJANENSIS FLAVIPECTUS Sclater.

Cyclarhis flavipectus Scl., P. Z. S. 1858, p. 448 (Trinidad); Berlepsch & Hartert, p. 13.

Common. In life the eye is tawny ochraceous; bill drab above, plumbeous grey below; feet vinaceous buff.

On my first expedition to the Orinoco I found this species breeding at the end of August. In 1907 I found a nest at La Casabel (near the mouth of the San Feliz on the Cuchivero River) on the 23rd day of May. The nest was situated in a *Chaparo* oak that stood near the edge of an extensive open savanna. It was placed at the extreme tip of a long horizontal limb, about 4.5 m. from the ground, suspended between forked twigs. For a pendant nest it was unusually shallow; the walls thin, and it might be described almost as a net woven between the forks and sagging in the centre. Outwardly it was composed entirely of soft grasses, and there was an inner lining of a very few hair-like vegetable fibres. The attachment to the supporting twigs was slight and frail-looking. The nest walls were so thin and the meshes so open, that the eggs were visible when looking from the ground through the bottom of the nest. The nest cavity is oval in form and measures inside 7.2 by 6 cm., depth 1.6 cm.¹ The eggs, three in number, were fresh. They are ovate in form; white, faintly washed with buffy pink and marked with blotches, spots and tiny dots, varying in color from hazel brown to dark chestnut. The eggs measure 22 x 16.5; 23 x 16.5 and 22.75 x 16.5 mm. respectively. The male was shot as he left the nest; the female was not seen.

HIRUNDINIDAE—THE MARTINS AND SWALLOWS.

Seven species are included in Berlepsch and Hartert's paper on the Birds of the Orinoco Region. The writer secured only five of the species there listed but has since collected another species, one not previously recorded from the region. All but the Barn Swallow are probably resident species and three of the number have been found breeding. *Progne*, *Iridoprocne* and *Diplochelidon*² were the most common, the latter two very abundant.

¹The nest found at Urbana on the Orinoco, Aug. 28, 1898, measured inside 7 cm., depth 3.5 cm. Ridgway, Birds of North and Middle America, III, 1904, p. 27.

KEY TO THE SPECIES AND SUBSPECIES OF HIRUNDINIDÆ.

- a. Nostrils rounded, opening upward, and under parts not entirely white; no white spots on inner webs of rectrices.
- b. Size large; wing more than 120 mm.
- c. Chin and upper throat nearly uniform with breast. Entire upper parts, in adults, glossy blue black, in young blackish, washed with glossy steel bluish; lateral rectrices narrowed terminally.
- d. Under parts glossy steel blue like upper parts (adult male), or else feathers of throat and chest edged with paler, giving a squamate appearance (female and young)..... *Progne subis subis*.
- d'. Under parts not glossy steel blue like upper parts, and throat and chest feathers without prominent paler margins—not squamate... *Progne chalybea chalybea*.
- e'. Chin and upper throat much paler than breast. Upper parts brownish grey with a faint gloss; lateral rectrices more rounded terminally. *Phaeoprogne tapera immaculata*.
- b'. Smaller; wing less than 115 mm.
- c. Tail less than half as long as wing.
- c'. Tail half as long or more than half as long as wing..... *Pygochelidon¹ cyanoleuca²*
- d. Under tail-coverts white (with blackish subterminal spots in same) and throat or crown, or both, rufous or tawny.
- e. Both crown and throat tawny or rufous..... *Alopochelidon³ fucata⁴*
- e'. Throat only, tawny or rufous; outer primary roughened by recurved tips to the barbs (not apparent in young)..... *Stelgidopteryx ruficollis aequalis*.
- d'. Under tail-coverts black, blackish or brown with slight purplish wash, no rufous or tawny on either throat or crown; tail rather deeply forked.
- c. In adults a blue black band across breast, throat and belly white..... *Diplochelidon melanoleuca⁵*
- e'. Under parts glossy blue-black (like the back) with a band of white across the breast..... *Atticora fasciata*.
- a'. Nostrils longitudinal, opening laterally, at lower edge of nasal fossa; under parts white, or rectrices marked with white spots on inner webs near tips.
- f. Rectrices with white spot on inner webs..... *Hirundo erythrogaster⁶*
- b'. Rectrices not marked with white spots near tips on inner webs..... *Iridoprocne albiventer*.

PROGNE SUBIS SUBIS (Linnaeus).

Hirundo subis L., Syst. Nat. ed. 10 I. 1758, p. 102.

Progne subis Berlepsch & Hartert, p. 14.

Not met with on the Orinoco proper but Klages sent examples to the Tring Museum that were collected at Suapure on the Caura River in March and April as recorded by Berlepsch and Hartert.

¹*Pygochelidon*, Baird, Review Am. Birds, 1865, pp. 270, 305, 308 (Type, *Hirundo cyanoleuca* Vieillot).

²While I find no record of this species having been taken in the region under consideration further collecting will doubtless discover it as it has occurred at La Guayra, Venezuela, on the Island of Trinidad and at several points in British Guiana.

³*Alopochelidon*, Ridgway, Birds N. & M. Amer., III. 1904, p. 26 (Type, *Hirundo fucata* Temminck).

⁴Although this species has not been recorded from the Orinoco, I include it in the key on the strength of its having been taken in the Roraima district in British Guiana.

⁵I have not sufficient material to properly characterize the young of this form, but from specimens before me I am led to think that in juvenal plumage the throat is greyish brown, with the feathers narrowly margined with pale greyish; breast, belly and shorter under-tail coverts white; longer tail coverts brown washed with purplish blue near tips.

⁶This species has been recorded from the island of Curacao, from Barbados, from Trinidad, and from several points in British Guiana, but there are as yet apparently no records for the Orinoco region.

PROGNE CHALYBEA CHALYBEA (Gmelin).

Hirundo chalybea Gm., Syst. Nat. I. 1788. p. 1026.

Progne chalybea Berlepsch & Hartert, p. 14.

Native name *Golondrina*. Common at Altagracia, Caicara and Quiribana de Caicara from December to April. Immature birds were collected at Las Guacas on the San Feliz River (near the Cuchivero River) in May.

Klages collected specimens on the Caura (Am. Mus. Coll.) in July and August.

PHAEOPROGNE¹ TAPERA IMMACULATA Chapman

Hirundo tapera L., Syst. Nat. ed. 12. I. 1766. p. 345.

Progne tapera Berlepsch & Hartert, p. 14.

Phaeoprogne tapera immaculata Chapman. Bull. Am. Mus. Nat. Hist. XXXI. 1912. p. 156 (Type ♂ Chicoral, Tolima, Colombia, in American Museum of Natural History).

A single specimen of this species was collected at Caicara, July 4th, 1898. None were observed on my more recent expeditions.

In the American Museum is a series of ten specimens collected by Klages sent from Suapure and Maripa on the Caura River, and two examples of *Progne chalybea chalybea*, one from La Union and the other from Maripa, indicating that this is the common form on the Caura, while my own experience showed *P. chalybea* to be the common form along the middle stretches of the Orinoco.

The American Museum specimens of *P. tapera immaculata* from the Caura river were collected during April, May and December.

STELGIDOPTERYX RUFICOLLIS AEQUALIS Bangs.

Stelgidopteryx ruficollis aequalis Bangs, Proc. New Engl. Zool. Club. II. 1901. p. 58 (Type, Santa Marta, Colombia).

Stelgidopteryx ruficollis uropygialis Berlepsch & Hartert, p. 15.

Common all along the middle and lower Orinoco throughout the year. Specimens were collected in February, March, May, June and August.

Two specimens in juvenal plumage were taken at Caicara during June. These young birds are interesting in that one does not show

¹*Phaeoprogne*, Baird Review Am. Birds 1895. pp. 272, 283.

a sign of the dusky or blackish spot at the tip of the longer under tail-coverts while in the other there is a small dusky spot near the tip of one web only. The outer web of the outer primaries of these juvenile birds is wider than in adults and the recurved tips to the barbs are scarcely evident. The plumage above resembles that of the adults, but the feathers of the back are narrowly edged with buff. The pale rufous or buffy tips to the greater wing-coverts form a decided band on the wing, and there are broad tips and edgings to the tertials. Below, the breast and sides are washed with pale rufous, paler than that on the throat. The centre of the white belly is washed with pale primrose yellow. An adult male taken at Las Barrancas seems to approach *ruficollis ruficollis* in the less evident paler rump and in the somewhat deeper rufous of the throat.

DIPLOCHELIDON¹ MELANOLEUCA (Wied).

Hirundo melanoleuca Wied, Reise. Bras. I. 1820. p. 342

Atticora melanoleuca Berlepsch & Hartert, p. 15.

Common along the middle stretches of the river and rarely seen far from the river bank.

In life the eye is blackish; bill and feet black.

I found this species breeding at Caicara during February and March, 1898. The nests were placed far back in crevices between the rocks of a long low rocky peninsula which extends far out into the river, and was less than 2 m. above the surface of the river at that time. During the rainy season it would be many feet submerged. The nests were slight affairs made up of a small quantity of soft dead grasses lined with soft feathers. The eggs are a delicate pure white.

This species played an important part in an interesting spectacle that I witnessed, on the evening of the 10th of July, 1898, half way between Caicara and Altagracia. I had made my canoe fast in a tree top, above one of the many submerged islands that are so common in the Orinoco, at that season of the year. As a storm was gathering and it was near sun-down, we were too far from either shore to attempt to reach solid ground for a camp. But the bird drama I witnessed that evening amply repaid me for the night spent in the tree tops. Just before darkness I noted immense numbers of *Progne chaly-*

¹*Diplochelidon*, Ridgway, Proc. Biol. Soc. Wash., XVI, 1903, p. 106. (Type *Hirundo melanoleuca* Wied.)

bea, *Iridoprocne albiventer*, *Diplochelidon melanoleuca* and perhaps other species, arriving at or above one of the nearby islands of green tree tops, where already there seemed to be tens of thousands of birds wheeling and circling about. The great masses of winged bits of life seemed to be influenced by a single mind, rolling like a wind driven storm cloud, first to one end of the island and then to the other. Now rising high in the air, the next moment dropping almost into the tree-tops, then rising and circling again, the moving mass would resolve itself into a living cone descending rapidly point downward with a roar like a whirlwind. During this movement thousands appeared to drop into the tree-tops, then all orderly formation would be lost and the remaining multitudes returned to the rolling circling mass that marshalled its forces for another plunge toward the tree-tops. Darkness and the black angry clouds of the coming storm hid the last acts of the bird drama and we crept beneath the *carosa*¹ of our dugout canoe, where protected from the storm we were soon lulled to sleep by the rocking of the boat.

ATTICORA FASCIATA (Gmelin).

Hirundo fasciata Gmelin Syst. Nat. I. 1788. p. 1022 (Cayenne).

Atticora fasciata Berlepsch & Hartert, p. 15.

This species was not collected on the Orinoco proper, but examples were sent from the Caura River district to the Tring Museum by Klages (Berlepsch and Hartert); and in the American Museum collection are examples, also collected by Klages, from the Mato River (at its entrance into the Caura), taken in January.

IRIDOPROCNE ALBIVENTER (Boddaert).

Hirundo albiventer Bodd., Tab. Pl. Enl. 1783. p. 32.

Tachycineta albiventer Berlepsch & Hartert, p. 14.

Common along the river, frequenting the localities where there is little current, these birds may be seen sailing tirelessly back and forth close over the surface of the water.

I found this species breeding at Altigracia in February, 1898. Nests were placed over the water in the hollow trunks and branches

¹The roof or cover of the roofed-over part of a river canoe, in form like that of the canvas top of a covered wagon, usually consists of a light frame of bent poles having the two ends securely tied to the opposite edges of the canoe, the hoops being held in position above by other light poles bound on lengthwise of the canoe; this frame work is then thatched commonly with leaves of some species of palm.

of trees that lay as half submerged "snags." In 1907 I took a nest and set of eggs at Agua Salada de Ciudad Bolivar on the 13th of April. The nest was placed in a crevice between two huge boulders on the shore of the river and was about 1.5 m. above the level of the water. It was composed outwardly of fine rootlets and was lined with soft feathers. Five eggs were in the nest; two of them perfectly fresh, two just on the point of hatching, and one blackened in color and with its contents dried down into one end of the egg shell. This last egg was probably from a previous nesting. In color, the eggs are pure white; in form, short ovate, and measure 18×13.5 ; 17.5×13.5 ; 17.25×13.5 and 17×13.25 mm., respectively.

Both parent birds were present and evinced much solicitude for their home. Both were collected. They are in rather worn plumage with scarcely a trace of the white tips and outer edges to the greater wing coverts, while the white edging to the outer web of the inner secondaries is very narrow. This pair of birds also seem unusually small, the male measuring: wing 98, tail 46 mm.; female, wing 97, tail 47 mm.

COEREBIDAE—THE HONEY-CREEPERS.

Seven species were included in Berlepsch and Hartert's paper, of which number the writer met with only three (*Dacnis cayana cayana*, *Cyanerpes caerulea cherriei* and *Coereba luteola*) on the Orinoco proper. Two additional forms have been recorded from the region since the publication of the above mentioned paper, and it is probable that future collecting will increase the number by four or five more species already recorded from adjoining territory.

KEY TO THE GENERA, SPECIES AND SUBSPECIES OF COEREBIDAE.

- a. Bill abruptly hooked at tip. *Diglossa*.¹
- a'. Bill not abruptly bent and hooked at tip.
- b. Superciliaries not white nor yellowish white.
- c. Bill longer than tarsus.
- d. Mandible yellow or yellowish. *Chlorophanes spiza spiza*.
- d'. Bill black (both maxilla and mandible); males rich blue above and below; females green, or greenish, above; paler below and more or less streaked. *Cyanerpes*.
- e. Adult males, with interscapulum black and throat blue like breast; females and immature males with under wing-coverts and inner edges of wing quills yellow. *Cyanerpes cyanea cyanea*.

¹The only species of *Diglossa* at all likely to come into the region under consideration would be *D. major* from British Guiana (Roraima).

- c'*. Adult males, interscapulum blue, chin and throat black, females and immature specimens with white, or yellowish white, under wing-coverts and inner edges to wing quills.
- f*. Black of throat not extending on to the chest.
- g*. Larger; wing, 56 to 59 cm.; tail, 28 to 31 cm., and blue of back and head deeper and richer. *Cyanerpes caerulea caerulea*.
- g'*. Smaller; wing, 53 to 55 cm.; tail, 26 to 26.5 cm.; general color a paler blue, the anterior part of crown and cheeks a pale azure blue. *Cyanerpes caerulea cherriei*.¹
- f'*. Black of throat extending on to the chest. *Cyanerpes nitida*.
- c'*. Bill not longer than tarsus. *Dacnis*.
- d*. Males, more or less black about the head (chin, throat lores, etc.); or, nearly uniform dark purplish blue, or bluish grey above.
- e*. Chin and throat black or blackish. *Dacnis cayana cayana*.
- f*. General color blue. *Dacnis flaviventris*.
- f'*. General color yellow. *Dacnis angelica*.²
- e'*. Chin and throat not black or blackish. *Ateledacnis analis*.³
- f*. Bright blue below, centre of belly white. *Ateledacnis bicolor*.
- f'*. Not bright blue below.
- g*. Above dark purplish blue.
- g'*. Above bluish grey.
- b'*. Superciliaries white, or yellowish white. *Coereba luteola*.
- c*. A white spot at base of primaries. *Coereba luteola luteola*.
- d*. Averaging smaller (wing average 54 mm.) yellow of breast, abdomen and upper tail coverts paler. *Coereba luteola hellmayri*.
- d'*. Averaging larger (wing 57 mm.) yellow color darker and richer. *Coereba guianensis*.
- c'*. No white spot at base of primaries.

CHLOROPHANES SPIZA SPIZA (Linnaeus).

Motacilla spiza L., Syst. Nat. ed. 10. I. 1758. p. 188. excl. var. β .

Chlorophanes spiza Berlepsch & Hartert, p. 15.

Chlorophanes spiza spiza Hellmayr, Novit. Zool. XIII. 1906. p. 10.

While I have not observed this species either on the middle or on the Upper Orinoco, it has been recorded from Guanoco in the Orinoco Delta by Hellmayr, and Klages sent specimens from Suapure and Nicare on the Caura River to the Tring Museum, as recorded by Berlepsch and Hartert.

CYANERPES CYANEA CYANEA (Linnaeus).

Certhia cyanea L., Syst. Nat. ed. 12. I. 1766. p. 188.

Cyanerpes cyanea cyanea Hellmayr, Novit. Zool. XIII. 1906. p. 10.

This species has been recorded from the Orinoco Delta (Guanoco) by Hellmayr, and Beebe secured specimens at the same locality in April, 1908.

CYANERPES CAERULEA CAERULEA (Linnaeus).

Certhia caerulea L., Syst. Nat. ed. 10. I. 1758, p. 118. (Surinam).

Cyanerpes caerulea caerulea Hellmayr, Novit. Zool. XIII. 1906. p. 8.

Recorded from Guanoco (Orinoco Delta) by Hellmayr.

¹*C. caerulea trinitatis* Bonaparte (Hellm. Novit. Zool. XIII. 1906. p. 8) is believed to be confined to the island of Trinidad. It may, however, occur on the mainland of Venezuela. From *C. c. caerulea* and *c. cherriei* it is distinguished by its larger and (at the base) broader bill; and by the dark blue of the crown being uniform from the forehead to the nape.

²Recorded from British Guiana.

³Recorded from Cayenne.

CYANERPES CAERULEA CHERRIEI Berlepsch & Hartert.

Cyanerpes caerulea cherriei Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 16. (Type, Munduapo, Orinoco River.)

The type and five other individuals were taken at Munduapo, in the heavily forested region above the falls. Neither this nor *Dacnis cayana*, which was also observed above the falls of the Orinoco, were noted on the middle or lower stretches of the river.

CYANERPES NITIDA (Hartlaub).

Coereba nitida Hartl. Rev. Zool. 1847. p. 84; Berlepsch & Hartert, p. 16.

Specimens collected on the Caura River at Suapure by Klages and at Nicare by André were recorded by Berlepsch and Hartert. Not observed on the Orinoco proper.

DACNIS CAYANA CAYANA (Linnaeus).

Motacilla cayana L., Syst. Nat. ed. 12. I. 1766. p. 336.

Dacnis cayana Berlepsch & Hartert, p. 15.

Common at Maipures, at the second falls of the Orinoco. Although not noted by the writer elsewhere on the river, Beebe took specimens at Guanoco in the delta region.

DACNIS FLAVIVENTRIS Lafresnaye & D'Orbigny.

Dacnis flaviventris Lafr. & D'Orb., Mag. de Zool. VII. 1837. p. 21; Berlepsch & Hartert, p. 16.

A single specimen collected at Nicare on the Caura River was sent by André to the Tring Museum and recorded in Berlepsch and Hartert's paper.

DACNIS BICOLOR (Vieillot).

Sylvia bicolor Vieillot, Ois. Amer. Sept. II. 1807. p. 32.

Dacnis bicolor Beebe, Zoologica, N. Y. Zoo. Soc. I. Dec. 1909. p. 102 (Caños an Juan, Guanoco, Orinoco Delta).

This species was not observed by the writer and I believe Mr. Beebe's record is the first and only one for the Orinoco region.

COEREBA LUTEOLA LUTEOLA (Cabanis).

Certhiola luteola Cabanis, Mus. Hein. I. 1850. p. 96; Berlepsch, Ibis, 1884. p. 432 (Angostura).

Coereba luteola Berlepsch & Hartert, p. 16.

Abundant. This species is found breeding most abundantly throughout the dry season; but, from my observations, I believe that they are to be found nesting during every month of the year. The nests are usually placed in small trees or bushes from 1 to 3.5 m. from the ground, the average height not being over 2 m. A nest taken at Caicara, June 27th was about 2 m. between upright forks, in the top of a bush. It is globular in form, about 12 cm. in diameter with a small round entrance at nearly the centre on one side. The materials used in construction are rather coarse and consist of dead grasses, leaves, weed stems, strips of fibrous bark and pieces torn from banana leaves. There is a lining of fine soft dead grass. The three eggs found in this nest are ovate in form and measure 15.75×11.75 and 15.5×11.75 mm.

On April 9, 1907, a nest and set of two badly incubated eggs were taken at nearly the same spot where those described above were found. This nest was about 2.4 m. from the ground. The eggs are less thickly marked, although the individual markings seem larger. In one they are pretty evenly scattered over the entire surface of the egg, being massed together only in a comparatively small area about the larger end. In the other egg the markings over the general surface are tiny dots, but there is a band of color just at the point of greatest diameter. The form is ovate, and they measure 16.75×12.75 and 17×12.5 mm. respectively.

Another nest that was collected is very compactly built, composed almost exclusively of very fine vegetable fiber woven into spherical shape, and was securely placed between the upright forks of one of the branches of a low shrub about 1 m. from the ground.

Nests of this species, collectively, show considerable individual taste in the selection of nesting material, and the finished nests indicate that some birds are far more expert builders than others, their finished work being compact and symmetrical, while that of others has a slovenly, ragged appearance.

COEREBE LUTEOLA HELLMAYRI Riley.

C[oeroba] trinitatis Lowe. Ibis. 1907. p. 566 (Trinidad).

Coereba luteola hellmayri Riley, Proc. Biol. Soc. Wash. XXIII: 1910: p. 100.

This race is included in our list based on specimens from the Paria Peninsula (Cristobol, Colon) in the American Museum collection which compared with Trinidad examples seem identical. Thus the range of this race is extended to the mainland.

COEREBIA GUTANENSIS (Cabanis).

Certhiola guianensis Cab., Mus. Hein. I. 1850. p. 97.

Coereba guianensis Berlepsch & Hartert, p. 17.

Klages sent specimens to the Tring Museum that were collected at Suapure on the Caura River; and there is a typical example in the American Museum collection, sent by the same collector from Ciudad Bolivar. So that *C. l. lutcola* and *C. guianensis* are found together at that point.

TANGARIDAE—EUPHONIAS AND TANAGERS.

Eighteen species and subspecies were collected by the writer on the middle and upper Orinoco, in the immediate vicinity of the river, which together with twelve additional species taken at various points on the Caura River formed the list of thirty included in Berlepsch and Hartert's paper.

Probably all, excepting *Piranga rubra*, are resident species, although the number of species or the number of individuals that may be found in any particular locality at any given season is influenced largely by the ripening of the various fruits that constitute their chief food.

KEY TO THE GENERA, SPECIES AND SUBSPECIES OF TANGARIDAE

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|-----|--|--|
| a. | Middle of belly and general color of under parts yellow, yellowish or rufous orange (not ochraceous nor buff) the throat and upper breast and the sides and flanks may or may not be uniform with the belly. | |
| b. | No blue or black markings on sides or flanks. | |
| c. | Throat black, blue-black or purplish black. | |
| d. | No yellow or yellowish markings on the head (male) | <i>Tanagra¹ rufiventris.</i> |
| d'. | Forehead and more or less of crown yellow or yellowish. | |
| e. | Under tail coverts white | <i>Tanagra olivacea olivacea.</i> |
| e'. | Under tail coverts yellow or yellowish white. | |
| f. | Under parts dark chrome yellow; yellow crown patch extending little, if any, back of eye and truncated, rather than rounded in outline; back and nape with a decided violaceous gloss. | <i>Tanagra chlorotica aurea.</i> |
| f'. | Under parts pale orange-yellow; yellow crown patch extending back of eye and posterior outline convex rather than truncated; back and nape with a decided steel blue gloss | <i>Tanagra trinitatis.</i> |
| c'. | Throat not black, blue-black, or violaceous black. | |
| d. | Upper parts olive or olive-greenish (and crown not blue). | |
| e. | Crissum rufous-orange (female) | <i>Tanagra rufiventris.</i> |
| e'. | Crissum, orange-yellowish, yellow, yellowish or yellowish white. | |
| f. | Wing less than 60 mm. (females) | <i>Tanagra</i> { <i>chlorotica aurea.</i>
<i>trinitatis.</i>
<i>olivacea olivacea.</i>
<i>chlorotica lichten-</i> |
| f'. | Wing not less than 60 mm. (females) | <i>Tanagra</i> { <i>steini.</i>
<i>melanura.</i> |
| d'. | Upper parts black with violaceous or steel blue gloss. | |
| e. | Outer tail-feathers marked with white on inner webs | <i>Tanagra violacea lichten-</i>
<i>steini.</i> |
| e'. | No white markings on inner webs of outer tail-feathers | <i>Tanagra melanura.</i> |
| b'. | Sides and flanks blue flecked with black. | |
| c. | Middle of breast and abdomen pale sulphur yellow; shoulder patch of caerulean rather than greenish blue (Upper Orinoco and Upper Caicara river region) | <i>Tanagra mexicana media.</i> |

¹The characters here employed to distinguish the various species of *Tanagra* apply, with rare exceptions, to the males only.

- c'*. Middle of breast and abdomen bright yellow, and shoulder patches greenish blue (Trinidad and Eastern Coast district of Venezuela) *Tangara mexicana vieilloti*.
- j'*. General color of under parts not yellow or if middle of belly is yellow it is in combination with decidedly green breast and sides.
- b*. General color of under parts olive green (with or without purplish gloss), blue, grey, pale grey or white, and without a dark breast band.
- c*. Throat black, blackish, purple or yellow (in adults).
- d*. Throat yellow (males).
- e*. Above dull sooty black; lower back bright yellow *Hemithraupis flavicollis auricularis*¹.
- e'*. Above cinereous; head and neck orange red *Thlypopsis sordida sordida*.
- d'*. Throat black, blackish or purple.
- e*. Crissum black *Tangara paradisica*.
- e'*. Crissum, not black.
- f*. Tail long and graduated, feathers tipped with white *Cissopis leveriana*.
- f'*. Tail feathers not white tipped *Schistochlamys aterrima*.
- c'*. Throat not black, blackish nor yellow *Tanagraella iridina*.
- d*. Middle of belly chestnut
- d'*. Middle of belly not chestnut.
- e*. Above olive green.
- f*. Crown bright blue *Sporathraupis cyanocephala subsericea*.
- c'*. Crown olive green
- e'*. Not olive green above.
- f*. Under parts pale greyish or whitish and wing not over 80 mm. (male, cap black; female, nearly uniform cinereous grey above).
- f'*. Wing more than 80 mm.
- g*. Under tail coverts (crissum) white or pale bluish white *Nemosia pileata*.
- g'*. Under tail coverts not white nor pale bluish-white *Thraupis glaucocolpa*.
- h*. Lesser wing coverts violaceous or violet (and the under parts in adult plumage glossed with greater or lesser intensity with violet) *Thraupis cyanea*.
- h'*. Lesser wing coverts blue and under parts with a greenish rather than a violet or bluish gloss *Thraupis cana cana*.
- b'*. General color of under parts not olive-green, blue, grey, pale grey nor white or else with a distinct dark breast band.
- c*. Above and below bright vermillion *Piranga rubra rubra*.
- c'*. Not bright vermillion.
- d*. A distinct blackish band across breast *Tangara nigrocincta*.
- d'*. No dark breast band.
- e*. General color of under parts green.
- f*. Head chestnut brown and middle of belly blue or green.
- g*. Bend of wing golden yellow *Tangara gyrola*.
- g'*. Bend of wing uniform with remaining upper surface *Tangara desmaresti*.
- f'*. Head green, feathers black at base; middle of belly yellow *Tangara xanthogastra*.
- e'*. General color of under parts not green.
- f*. Outer edges of wing-quills greenish blue or bluish green *Tangara cayana*.
- f'*. Outer edges of wing-quills not greenish nor bluish.
- g*. Mandible enlarged and swollen at base; breast dark maroon (males) *Ramphocelus atroservaceus*.
- h*. Back and belly black (males); females, above dusky seal brown *Ramphocelus capitalis*.
- h'*. Upper parts velvety blackish maroon glossed with crimson (males); females, above dark mummy brown.
- i*. Larger, wing 80 mm. or more *Ramphocelus carbo magnirostris*.
- i'*. Smaller; wing less than 80 mm. *Ramphocelus carbo carbo*.
- g'*. Mandible not noticeably enlarged and swollen at base.
- h*. With a well marked median vertical crest (males).
- i*. Median crest bright scarlet *Phoenicothera rubica*.
- i'*. Median crest not scarlet.
- j*. With an ochraceous or buffy throat spot.
- k*. Crest small, bright orange red bordered with creamy buff *Tachyphonus cristatus cristatus*.
- k'*. Crest larger, orange yellow narrowly bordered with creamy buff *Tachyphonus cristatus intermedius*.
- j'*. No gular spot; throat uniform with breast (male) *Tachyphonus surinamus*.
- h'*. Without elongated median vertical crest.

¹See American Museum Bull.

1. Black above and below, with white under wing-coverts and shoulder patch.
- j.* Larger; wing more than 75 mm. (males) *Tachyphonus rufus*.
 - j'*. Smaller; wing less than 75 mm. (males) *Tachyphonus luctuosus*.
 - i.* General color above and below not black.
 - j.* Pileum (but not sides of head) dark grey with a more or less concealed olive green crown patch (female) *Tachyphonus surinamus urinamus*.
 - j'*. Pileum not dark grey.
 - k.* Smaller; wing not over 65 mm. (female) *Tachyphonus luctuosus*.
 - k'*. Larger; wing over 65 mm. (females).
 - l.* Above plain rufous chestnut *Tachyphonus rufus*.
 - l'*. Above bright olive brown; bases of crown feathers bright buffy or yellowish olive forming a more or less concealed crown spot *Phoenicothera rubica rubica*.

TANAGRA CHLOROTICA Linnaeus.

Tanagra chlorotica L., Syst. Nat. ed. 12. I. 1766. p. 317.

Euphonia chlorotica Berlepsch & Hartert, p. 17.

During the first expedition to the Orinoco, a series of *Euphonia* from Altagracia, Caicara, Quiribana de Caicara and Maipures were sent to the Tring Museum and identified by Berlepsch and Hartert, as pertaining to this species. At that time I seemed to have observed many more examples of this species than I did of *E. trinitatis*, but during the two last expeditions specimens of the latter species only have been collected.

No specimens of this species were found among the birds sent to the American Museum by Klages either from the neighborhood of Ciudad Bolivar or from points on the Caura River.

TANAGRA TRINITATIS (Strickland).

Euphonia trinitatis Strickl., Contr. Orn. 1851. p. 72; Berlepsch & Hartert, p. 17.

Venezuelan common name "Fin-fin" or "Sin-fin." On the recent expeditions I found this species common.

A female in adult nuptial plumage (taken June 14th) is a rich olive-green above, below, chrome yellow with sides of breast and flanks a deep olive yellow. Females in what is probably the first nuptial plumage are quite different from those in adult plumage and resemble greatly birds in juvenal dress. A female in what I consider the first nuptial plumage, taken April 17th, is greyish olive-green above; below, the throat, sides, flanks and under tail-coverts are olive yellow brightest on the under tail-coverts, centre of breast greyish, centre of abdomen greyish white.

A male in juvenal plumage, taken May 30th is greyish olive-green above (of a lighter shade than the female of May 10th); below, breast greyish, abdomen white, sides of breast light greyish olive;

throat, flanks and under tail-coverts light citron yellow, palest on the throat. Females in juvenal plumage resemble males in the same plumage.¹

The colors from an adult male taken June 28th were: eye seal; bill, above black, below plumbeous; feet slate grey. A male just assuming the adult phase had the bill above slate black, below slate grey with blackish tip.

In the series in the Brooklyn Museum and the Klages specimens in the American Museum the yellow on the crown is about intermediate in amount between that on the crown of *E. chlorotica violaceicollis* from Chapado Matto Grosso,² and *E. trinitatis*³ from Bonda, Santa Marta, Colombia. The Santa Marta birds probably represent a distinct race.

In the American Museum collection are specimens, sent by Klages, collected on the Caura River, during September and December, and from Ciudad Bolivar on the Orinoco collected in December. My own notes show that specimens were collected at various points on the Orinoco from March to August inclusive.

A nest and set of three fresh eggs together with the mother bird was collected at Agua Salada de Ciudad Bolivar April 17, 1907. The nesting site was a *Chaparo* oak in the midst of a savanna that was dotted thinly with trees. The nest was located near the tip of a long horizontal branch and only about 1.4 m. from the ground. In shape it is a flattened ball and is constructed entirely of dry grasses, of medium texture loosely woven into shape and is without other lining. The entrance is a round hole in the middle of one side. The nest rested on the main branch and two small horizontal twigs that proceed from opposite sides of the main branch, the result being a cross-shaped support. It was not tied in any way to the supporting branches and certainly gave one the impression that it was very insecure. My thought at the time of finding it was that with the first puff of wind it would go tumbling to the ground. The measurements are: horizontal diameter about 15 cm., vertical diameter about 10 cm.; the entrance hole is 3.5 cm. in diameter. The eggs are from ovate to medium short-ovate in form. They measure 15.5 x 12.25; 17.75 x 12

¹An examination of the specimens of *Tanagra* in the collections of the American Museum and the Brooklyn Museum, together with a consideration of my field notes and observations convinces me that our greatest advance in knowledge of the specific character of the various members of the group will result from a careful, systematic study of age and seasonal plumages correlated with field observations.

²Am. Mus. Coll.

³Idem.

and 16.5 x 12.5 mm. They are white with brown markings varying in color from a light hazel to a dark chestnut. In two of the eggs the markings consisting of small specks and dots are quite uniformly and thickly distributed over the entire surface of the egg; in the third egg of the set the markings are much fewer in number, average much larger in size, and are thickly massed about the larger end.

TANAGRA OLIVACEA OLIVACEA (Desmarest).

Euphonia trinitatis Strickl., Contr. Orn. 1851. p. 72; Berlepsch & Hartert. p. 17.

Reported from Nicare, on the Caura River by Berlepsch and Hartert.

TANAGRA VIOLACEA (Linnaeus).

Fringilla violacea L., Syst. Nat. ed. 10. I. 1758. p. 182.

Euphonia violacea Berlepsch & Hartert, p. 18.

Specimens collected on the Caura River at Saupure, La Pricion and La Union were sent to the Tring Museum by André and by Klages.

In the American Museum are Klages specimens collected on the Caura River at El Llagual in March, Suapure in April, Maripa in May and at La Union in October.

TANAGRA MELANURA (Sclater).

Euphonia melanura Scl., Contr. Orn. 1851. p. 80; Berlepsch & Hartert. p. 18.

Two specimens, male and female, taken at Maipures, December 17, 1898.

TANAGRA RUFIVENTRIS Vieillot.

Tanagra rufiventris Vieill., Nouv. Dict. XXXIII. 1819. p. 426.

Euphonia rufiventris Berlepsch & Hartert, p. 18.

Collected about Manduapo in February, 1899. Not common.

TANAGRA CHRYSOPASTA (Sclater & Salvin).

Euphonia chrysopasta Scl. & Salv., P. Z. S. 1869. p. 438; Berlepsch & Hartert, p. 18.

This was the common form of *Tanagra* above the falls of the river while *T. trinitatis* was the common species along the middle part of the river

TANAGRELLA IRIDINA (Hartlaub).

Tanagra iridina Hartl., Rev. Zool. 1841. p. 305.

Tanagrella iridina Berlepsch & Hartert, p. 18.

Berlepsch and Hartert report a single specimen, a male, collected at Suapure on the Caura River and sent by Klages to the Tring Museum, and there is an adult male from La Union on the Caura River in the American Museum collection that was collected by Klages October 10th. This specimen agrees exactly with one from Bogota in the same collection.

TANGARA PARADISEA (Swainson).

Aglaia paradisea Swains., Class. Birds, II. 1837. p. 286.

Calliste paradisea Berlepsch & Hartert, p. 18.

Collected on the Caura River at Suapure by Klages and at Nicare by André, and recorded in the Berlepsch and Hartert paper.

TANGARA XANTHOGASTRA (Sclater).

Calliste xanthogastra Sl., Contr. Orn. 1851. pp. 23, 55; Berlepsch & Hartert, p. 19.

Berlepsch and Hartert report this species as also taken on the Caura at Nicare by André.

TANGARA CAYANA CAYANA (Linnaeus).

Tanagra cayana L., Syst. Nat. ed. 12. I. 1766. p. 315.

Calliste cayana Berlepsch & Hartert, p. 19.

This is the most abundant species of this group of Tanagers to be found along the Orinoco. Specimens were collected at many points from Ciudad Bolivar up to above the falls of Maipures; Klages collected a series at Maripa on the Caura River during December, February, April and May.¹

In life the eye is dark sepia brown; bill blackish above and slate color below; feet light slate color. Adult birds of this species if held between the observer and the light, on a level or slightly below the level of the eye, appear a beautiful iridescent golden bronze both above and below.

¹Am. Mus. Coll.

The nesting season on the Upper Orinoco begins in December, while on the middle stretches of the river from Caicara downward, breeding does not begin before the first of April.

A nest of this species taken at Quiribana de Caicara April 9th, was taken from the branches of one of the small scrub oaks that grow scattered over the open savanna. It was about 2.4 m. from the ground amid a cluster of small branches, and admirably concealed by green leaves from above and on the sides. The outer walls of the nest were constructed almost entirely of leaf stems; the lining consisted of very fine, hair-like grass and rootlets together with a few bits of greenish-white lichens. There were two eggs, both incubated, only one of which was saved. In color this was a "whitish-brown," finely speckled all over, but more thickly on the larger end, with rufous brown. It measured 20×15.1 mm.

A nest collected at Maipures on the 9th of January, was held between the slender tips of the upright branches of a dwarf scrub oak, which had found a scanty foothold between rocks near the river bank. It was only about 1.5 metres from the ground, was similar in construction to the nest described above, but had a number of half decayed leaves woven into the body of the nest, all bound together with cobwebs. This nest measures, outside 8.2 cm. diameter by 6.5 cm. depth; inside 5 cm. diameter by 3.4 cm. depth. In the black hair-like vegetable fibres of the inner lining are several bits of greenish-white lichens. The two eggs are ovate in form and measure 20×15.2 mm. In color they are a soiled white, thickly marked all over with fine specks and dots of a shade of brown between vandyke and chestnut which are so closely set about the larger end as to form a band. In one egg the specks and spots are much larger and more prominent than in the other. Not more than two eggs were found in each of more than a dozen nests examined, so that two is probably a normal clutch.

TANGARA MEXICANA MEDIA (Berlepsch & Hartert).

Calliste mexicana media Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 19. (Type, Tring Museum, Maipures, Orinoco River.)

This form of *Tangara* which is intermediate in coloration between *T. mexicana mexicana* from Cayenne and *T. mexicana vieilloti* of Trinidad and the delta region of the Orinoco, was common at Perico, at the foot of the falls of Atures, and as far beyond as I collected on the upper Orinoco. It is often mentioned in my notes.

from September to February. Not observed on the lower Orinoco, but Klages sent specimens from La Union and Suapure on the Caura River to the American Museum.

TANGARA MEXICANA VIEILLIOTI (Sclater).

Calliste vicilloti Scl., P. Z. S. 1856. p. 257.

Beebe secured specimens at Guanoco in the Orinoco Delta that agreed exactly with examples from Trinidad. There is a long stretch of country between the heavily timbered country above the falls and the equally heavily wooded region of the delta where no forms of *T. mexicana* seem to be found.

TANGARA NIGROCINCTA (Bonaparte).

Aglaia nigrocincta Bonap., P. Z. S. 1837. p. 121.

Calliste nigrocincta Berlepsch & Hartert, p. 20.

The Tring Museum received specimens from Suapure and Nicare on the Caura River, and it is reported by Berlepsch and Hartert.

Thraupis episcopus nesophilus Riley, Proc. Biol. Soc. Wash. XXV. 1912. 185.

THRAUPIS EPISCOPUS NESOPHILUS (Riley).

Tanagra cana Berlepsch & Hartert, p. 20, not Swains.

Native name *Azulejo*. Abundant. Found in all sorts of localities but not common in heavy timber.

The colors of fresh birds are: eye brown; bill blackish above, slate below; feet slate color.

On my first expedition to the Orinoco I took a nest and set of eggs of this species, on April 13, 1898. This nest was in a small scrub oak, about 6 m. from the ground. It was surrounded by a tangle of small twigs, and almost completely concealed by green leaves. The parent birds were very shy. The nest was thick-walled, outwardly composed chiefly of leaf stems, and lined with fine vegetable fibers and rootlets. The nest contained two eggs, both much incubated, only one of which was preserved. The egg is of a "dirty flesh-color, all over thickly covered with liver-brown and underlying pale purplish grey spots and patches, and measures 2.31×10.8 mm."

Berlepsch & Hartert, p. 20. Through mistake inserted the description of this nest and set of eggs under the head of *T. mexicanus mexicanus*.

Four sets of eggs were taken in 1907, all showing a very considerable amount of variation in the shade of color and the amount and size of the markings.

One set taken at Caicara on the 7th of May, contained two fresh eggs. In the nest was also one egg of the Venezuelan Cow-bird, *Molothrus bonariensis venezuelensis*. The two eggs of *T. episcopus nesophilus* are ovate in form and measure 21.75×16.5 mm. and 22×15.75 mm. respectively. In one the ground color is dirty white with just a shade of bluish green rather thickly marked with dots, spots and blotches of pale ecru drab, underlying spots and blotches of blackish clove brown; the general ground color of the other egg is darker, the underlying markings are larger, brownish drab in color, forming a nearly solid mass of color about the larger end, and the superimposed blotches are a dark vandyke brown. The nest taken with this set of eggs is similar to that described above, a compactly woven, thick-walled cup composed largely of leaf stems and a few dead leaves held in place by a small quantity of spider webs. The nest lining was composed of small pieces and short strips of some soft thin bark beneath a few pieces of fine dead grasses. The nest measures: outside, 10 cm. in diameter by 6.5 cm. in depth; inside, 6 cm. in diameter by 4 cm. in depth. It is loosely, and it would seem, most insecurely set at the intersection of a small twig, with a larger horizontal branch, the union forming a V-shaped support for the nest.

A nest containing one fresh egg was found near the same point May 8th. It was placed between the forks of three large limbs which sprang from the same point, two branching almost horizontally and one rising at an angle of about 45° from the horizontal. The nest rested at the base of the angle between the two horizontal limbs which concealed it from below, while the third limb extending out over the nest concealed it from above. In the same tree with this nest, and none more than 3 m. from it were nests of *Myiozetetes texensis columbianus*, *Pitangus sulphuratus rufipennis* and *Icterus xanthornus*, all occupied. The single egg found in this nest is ovate and measures 24.5×18.5 mm. The ground color is similar to that of those last described; the markings vary from a mars brown to a dark vandyke, and consist of dots and spots thickly spread over the entire surface, and especially about the larger end.

A nest found May 10th, also at Caicara, contained two badly incubated eggs. This nest was about 4.57 m. from the ground in a *gumal*

oak. One of the eggs was broken in removing the embryo. The single specimen preserved is ovate in form and measures 22.5×16.75 mm. The ground color of this egg is uniform with the two last described, but the general color of the egg surface is considerably lighter owing to the sharp outlines of the small spots, which are thickly scattered over the entire surface, especially about the larger end, and which vary in color from drab to clove brown.

A fourth set of two fresh eggs, taken May 21, 1907, on the San Feliz River near its junction with the Cuchivero River, are so heavily marked as to almost completely hide the dirty white ground. In one of the eggs the markings of brown, from a bistre to a vandyke, blend into and overlap one another over the entire surface of the egg. The other egg differs only in having a few superimposed dots, spots and blotches of dark clove brown scattered irregularly over the egg surface. These eggs are ovate in form and measure 22.25×17.25 and 22.25×17.5 mm. In the same tree with the nest from which these eggs were taken, and not 2 m. from it, was an occupied nest of *Tyrannus melancholicus*.

From my observations and the material secured we may conclude that normally this species lays two eggs, and that the nesting season lasts from April to June in the middle Orinoco region. Nests are placed from 1.5 to 6 m. from the ground, favorite nesting sites being in the guamal or scrub oaks that sparsely dot much of the savanna country, and frequently in trees occupied by nests of other birds.

This form of the Blue Tanager is found throughout the delta region along the middle Orinoco and up beyond the falls of Atures and Maipures, where it is found in company with and is gradually replaced by *T. episcopus episcopus*.

The American Museum has specimens from Maripa, on the Caura River, collected in February, April, May and December, and from Ciudad Bolivar on the Orinoco collected in June, July and December. One of the December birds from Ciudad Bolivar, in the paleness of the blue shoulder patch, approaches *T. episcopus episcopus*. There is a wide variation in the intensity of the coloring of the blue shoulder patch which is due largely, if not entirely, to age. However, the same might be said regarding the general coloring.

Birds in *juvénal plumage* are greenish grey, heavily washed on the back with sage green, below much paler and only faintly washed with a slightly yellowish green. Median and lesser coverts like the back;

greater coverts dusky blackish edged with glaucous green; remiges black, broadly edged on outer webs, on tertials and secondaries with glaucous green which changes to a beryl green on primaries. Centre pair of tail feathers bice green, brightest on outer webs, remaining rectrices with outer webs bice green, inner webs blackish.

First nuptial plumage. Above and below greenish grey; back and scapulars heavily washed with bice green; rump a bluish beryl green; head and neck all around, and under parts washed with glaucous green. Median and lesser wing coverts nearly a cobalt blue; greater coverts and outer webs of remiges dark bice green with the extreme outer edges between a glaucous and beryl green; inner webs of wing quills black. Tail above dusky with greenish wash; outer webs of rectrices edged with beryl green. Under surface of tail greyish blue or greenish, varying in color when seen at different angles.

Adult nuptial plumage. Similar to the first nuptial, but with the glaucous green wash of the under parts replaced by a decided violet or bluish wash; the greater wing coverts and remiges with edges of outer webs bright Nile blue, and the median and lesser wing coverts nearer an azure than a cobalt blue. Only about ten per cent. of the specimens collected will be in adult nuptial plumage.

THRAUPIS CANA CANA Swainson.

T[anagra] cana Sw. Ornith. Drawings, Pl. XXXVII. 1836.

This is found with *T. e. nesophilus* on the upper Orinoco from above the falls, and is there the more common of the two forms.

THRAUPIS PALMARUM MELANOPTERA (Sclater).

Tanagra melanoptera Scl., P. Z. S. 1856. p. 235.

Tanagra palmarum melanoptera Berlepsch & Hartert, p. 20.

The *Azulejo ordinario* as this species is known to the Venezuelans is equally common and often in company with *T. e. nesophilus*.

In fresh birds the eye is seal brown; bill black; feet slate grey.

Specimens from above the falls of Atures¹ are heavily washed with violet both above and below, and the tarsus averages shorter than in specimens from Trinidad and points on the middle and lower Orinoco. In the American Museum are specimens collected by Klages at Ciudad Bolivar, in June, July, August and December, and at Maripa on the Caura River in May.

¹Four specimens: two males and two females examined; collected in December, January and March

RAMPHOCELUS CARBO CARBO (Pallas).

Lanius carbo Pallas in Vroeg. Cat. rais. d'Oiseaux. Adumbrat p. 2 (1764—Surinam).¹

Ramphocelus jacapa auct.; Berlepsch & Hartert, p. 20.

Typical *R. carbo* is abundant in the heavily wooded region above the falls of Atures, and may be occasionally found as far down the Orinoco as the mouth of the Apure River and Caicara; but from that point until one arrives at the tangled jungle of the upper part of the delta region where *R. carbo magnirostris* and *R. atrosericus capitalis* abound, these tanagers are conspicuous by their absence.

Females. Above dark mummy brown, rich burnt umber on lower rump and upper tail coverts; wings and tail blackish brown; below chestnut shaded with dusky on breast; chin and throat drab.

Males in juvenal plumage. Resemble the female, but have the rump nearly a brick red, while on the throat there is a strong vinaceous wash. In the American Museum are specimens collected by Klages at Suapure and Maripa on the Caura River. They represent adults of both sexes collected during the months of May, September and November.

RAMPHOCELUS CARBO MAGNIROSTRIS Lafresnaye.

Ramphocelus magnirostris Lafresnaye, Rev. Zool. 1853. p. 243.

Ramphocelus jacapa magnirostris Hellmayr, Novit. Zool. XIII. 1906. p. 15 (Guanoco, Orinoco Delta).

Hellmayr records specimens of this species from Guanoco in the Orinoco delta, and I have examined specimens collected at the same point by Mr. C. Wm. Beebe that agree exactly with specimens from Trinidad.

RAMPHOCELUS ATROSERICEUS CAPITALIS Allen.

Ramphocelus atrosericus capitalis Allen, Bull. Am. Mus. IV. 1892. p. 51 (El Pilar near Cumana, Venezuela).

Five specimens collected by the writer at Las Barrancas have been compared with the type in the American Museum collection and found to agree exactly.

¹Hellmayr, Novit. Zool. XIII. 1906. p. 337.

Contrary to Mr. Hellmayr's conclusions based on material from Guanoco¹ I do not consider *R. a. capitalis* a synonym of *magnirostris* but a well marked race of *atrosericus* and very readily distinguishable from the former. Of the specimens secured two are adult males, one a male in juvenal plumage, and two (probably) adult females.

The females are almost as easily distinguished from the females of *R. c. magnirostris* as are the males one from another.

Adult female. Above dusky seal brown; wings and tail more blackish; rump washed with bright chestnut; faintly vinaceous on forehead. Below, throat and upper breast bright bay, blending gradually into bright chestnut with a faint wash of dragon's blood red on belly and sides.

Immature male. A specimen taken July 31st is in transitional plumage from juvenal plumage to what would correspond to the first winter plumage of our northern Passeres. Above its head is dusky brownish black; back bright reddish chestnut, produced by the broad edges and tips to black feathers; rump bright reddish chestnut; wings and tail brownish black; lesser, median and greater coverts narrowly tipped and edged with chestnut; wing quills edged with chestnut on outer webs; below, throat dusky brownish; remaining under parts bright chestnut, washed with rufous on sides and flanks. Bill, in life, dusky slate; feet dusky slate.

PIRANGA RUBRA RUBRA (Linnaeus).

Fringilla rubra L., Syst. Nat. ed. 10. I. 1758. p. 181.

Piranga rubra Berlepsch & Hartert, p. 21.

Not observed on the middle or lower river, but noted on the upper Orinoco at Maipures from November to February during my first expedition.

This is the only species of tanager observed in the Valley of the Orinoco that is not resident there.

PHOENICOTHAUPIS RUBICA RUBICA (Vieillot).

Saltator rubicus Vieill. Nouv. Dict. XIV. 1817. p. 107.

Beebe secured an example of this species at Guanoco. It had not been previously recorded from the Orinoco.

¹Novit. Zool. XIII. 1906. p. 15

TACHYPHONUS RUFUS (Boddaert).

Tanagra rufa Bodd., Tabl. Pl. Enl. 1783. p. 44.

Tachyphonus rufus Berlepsch & Hartert, p. 21.

Not uncommon, but usually a shy bird; found both in the open thinly timbered borders of the savannas, and in densely timbered regions.

The eye is seal brown; maxilla black, mandible plumbeous with a blackish tip; feet black.

A female, apparently adult, taken June 10th has a number of black feathers on the right side of the face, neck and breast.

The nesting season extends from March to May. Nests are usually from 0.6 to 1.5 m. from the ground, placed in clumps of low trees or bushes in the sparsely wooded savanna regions. Two eggs constitute a full set.

A nest with two slightly incubated eggs was taken at Caicara April 7th, 1907. It was only about 60 cm. from the ground in a clump of thorny palm stems. Outwardly, the nest is composed of coarse, short pieces and strips of soft inner bark from the rotting stubs of some nearby trees, short strips torn from dead banana leaves, and a few weed stems. Inside there is a thin lining of plant tendrils and fine, black horse-hair-like vegetable fibers. The nest measures: outside, 14 cm. in diameter by 7 cm. in depth; inside, 7 cm. diameter by 4.5 cm. in depth.¹ The eggs are ovate in form, and measure 17.25 x 22.25 and 17 x 22.25 mm. respectively. One is white with a faint greyish wash, the other has a mere suggestion of rufous in the ground color. The markings are comparatively few, scattered chiefly about the larger end, and consist of irregularly rounded spots and dots of dark clove brown overlying similar spots of pale lavender. Many of the larger clove brown spots are surrounded by rufous as though the color had spread or "washed."

In the American Museum collection is a male collected by Klages at Ciudad Bolivar that is just finishing the moult assuming the black plumage of the adult, but shows a few brown feathers scattered through the plumage; one outer rectrix is black at the base and brown at the tip.

¹A nest of this species taken on the heights of Aripo, Trinidad, March 24, 1907, has been already described by the writer (Sci. Bull. 1. p. 359). Only one of the eggs of the set contained in that nest was saved; that is ovate in form and measures 24.5 x 18.5 mm. It is white with a faint russet wash, marked with a few irregular spots and small dots of a blackish clove brown; there are also indications of a few underlying lavender markings.

TACHYPHONUS LUCTUOSUS Lafresnaye & D'Orbigny.

Tachyphonus luctuosus Lafr. & D'Orb., Syn. Av. in Mag. Zool. VII. 1837. p. 29; Berlepsch & Hartert, p. 21.

This species was not seen on the Orinoco proper, but Beebe took specimens at Guanoco in the delta region and I collected a single example May 26, 1907, at La Cascabel on the river San Feliz near its junction with the Cuchivero River.

The Tring Museum received specimens from Suapure, La Pricion, Nicare and La Union on the Caura River.

In the American Museum collection are specimens collected on the Caura River by Klages at El Llagual in March, Suapure in January and La Union in October.

In the La Cascabel specimen, an adult male, the eye was seal brown; bill above black, sides of mandible slate grey, center of ridge of gonys black; feet slate grey.

TACHYPHONUS CRISTATUS CRISTATELLUS Sclater.

Tachyphonus cristatellus Sclater. Cat. Am. Birds. 1867. p. 86 (Type, Bogota).

Tachyphonus cristatus Berlepsch & Hartert, p. 22.

Tachyphonus cristatus cristatellus Hellmayr, Novit. Zool. XII. 1905. p. 275.

The Tring Museum received specimens collected on the Caura River from both André and Klages; and in the American Museum collection is a series collected by Klages at Suapure, and at La Union on the Caura River during the months of September, October and February. This series includes both males and females in adult plumage, and immature specimens in transitional plumage. A "female" taken at Suapure, September 10th, is brownish olive above, washed with russet especially posteriorly, the rump being nearly pure russet; forehead and sides of crown greyish olive, centre of crown russet; wings and tail blackish; quills edged with mummy brown; sides of face olive but feathers of lores and auriculars with faint buffy shaft lines; below, raw sienna with buffy throat and under tail coverts ochraceous. An immature male taken at the same point is just assuming the plumage of the adult. The general color both above and below is black but interspersed with brownish olive feathers on the back and a few ochraceous ones below. The rectrices are all

brown as in the female; in the wings the outer four primaries are brownish black, edged with olive, the succeeding five are black as in the adult male. In the left wing the outermost secondary is black, the next two are brown, then a black one and the remainder brown; in the right wing the primaries are as in the left one, but the outer five secondaries are brown while the remainder are black. The crown is chiefly olive-grey with scattering orange-red feathers; the lateral and anterior border of buff is quite distinct.

TACHYPHONUS CRISTATUS INTERCEDENS Berlepsch.

Tachyphonus intercedens Berlepsch, Ibis. 1880. p. 113.

T[achyphonus] cristatus intercedens Hellmayr Novit. Zool. XII. 1905. 275.

The type of this species, according to Hellmayr (l. c.), is of the "Orinoco" make, and the Orinoco Delta is included by that writer in the habitat of this race.

TACHYPHONUS SURINAMUS SURINAMUS (Linnaeus).

Turdus surinamus L., Syst. Nat. ed. 12. I. 1766. p. 297.

Tachyphonus surinamus Berlepsch & Hartert, p. 22.

T[achyphonus] s[urinamus] surinamus Hellmayr, Novit. Zool. XIII. 1906. p. 358 (Guanoco, Orinoco Delta).

This species has been recorded from Guanoco in the Orinoco Delta, and also from various points on the Caura River by Berlepsch and Hartert.

There are two specimens in the American Museum collected by Klages at Suapure, one in September, the other in November. They agree exactly with Cayenne examples.

HEMITHRAUPIS FLAVICOLLIS AURIGULARIS Cherrie.

Nemosia flavicollis Vieill. Nouv. Dict. XXII. 1818. p. 491; Berlepsch & Hartert, Novit. Zool. IX. 1902. 22. (Suapure and Nicare, Caura River, Orinoco region).

N[emosia] flavicollis flavicollis Hellmayr, Novit. Zool. XIV. 1907. p. 351 (Suapure and Nicare, Caura River).

Hemithraupis flavicollis Sharpe, Hand List, V. 1909. p. 597.

Hemithraupis flavicollis auricularis Cherrie, Bull. Am. Mus. Nat. Hist. (Suapure, Caura River, Orinoco region).

In the American Museum collection are specimens collected by Klages at Suapure on the Caura River in February, September and November.

A male in that collection taken September 9, 1901, is in the plumage of the female.

The adult males from the Caura River differ from "Brazil" and "Bahia" skins, in the same collection, in having the white feathers of the upper breast and sides prominently marked with subapical v-shaped black bars. A specimen from Jungus, Bolivia, agrees in this respect. The "Brazil" and "Bahia" skins have the entire breast and belly strongly washed with pale lemon or sulphur yellow, the subapical bands dusky, and not at all prominent. Above, these birds have a brownish wash while the Suapure birds have a faint bronzy green wash and are also noticeably smaller.

Not noted on the Orinoco but recorded from its tributary, the Caura River, from Suapure and Nicare, by Berlepsch and Hartert.

THLYPOPSIS SORDIDA SORDIDA (Lafresnaye & D'Orbigny).

Nemosia sordida Lafr. & D'Orb., Syn. Av. I. 1837. p. 28.

Thlypopsis sordida Berlepsch & Hartert, p. 23.

Thlypopsis sordida sordida Hellmayr, Novit. Zool. XIII. 1906. p. 311.

Rare; six specimens collected for the Tring Museum during the months from August to January, at Capuchin, El Fraile and Alta-gracia; points on the middle Orinoco above Ciudad Bolivar and below the falls of Atures. Hellmayr in his paper on the types of little known species of birds¹ gives a list of localities from which specimens have been secured including points in Bolivia, Brazil, Venezuela and Eastern Ecuador.

CISSOPIS LEVERIANA (Gmelin).

Lanius leverianus Gm., Syst. Nat. I. 1788. p. 302.

Cissopsis leveriana Berlepsch & Hartert, p. 24.

Not observed on the Orinoco proper but reported in the Berlepsch and Hartert paper as taken at La Pricion on the Caura River.

In the American Museum Collection is a specimen from Suapure (Caura River), received from Klages.

SCHISTOCHLAMYS ATRA (Gmelin).

Tanagra atra Gm., Syst. Nat. I. 1788. p. 898.

Schistochlamys atra Berlepsch & Hartert, p. 24.

¹Novit. Zool. XIII. 1906. p. 311.

On my first Orinoco expedition, this species was observed at and above the falls of Atures only, from which point onward it was not uncommon, but in April, 1907, examples were collected at Agua Salada de Ciudad Bolivar.

An immature male in transitional plumage, just assuming the nuptial dress, is dark olive green above with patches of grey here and there where the nuptial dress is developing. There are many black feathers in forehead and fore part of crown, and a few grey ones on top of head. Wing-coverts olive green brighter than the back; wing- and tail-quills blackish brown edged with yellowish olive. Sides of face and throat black mottled with olive yellow; breast, sides and flanks grey slightly mottled with olive yellow; centre of abdomen and under tail coverts pale olive yellow.

Fresh birds have the eye chestnut brown; bill plumbeous grey basally and forward to slightly beyond the nostrils, distally black; feet slate grey.

FRINGILLIDAE—THE GROSBEAKS, FINCHES, BUNTINGS AND SPARROWS.

Berlepsch and Hartert's paper included twenty-two species and subspecies pertaining to this family. Of that number the writer had at that time collected nineteen. The present paper includes twenty-six species and subspecies.

With the exception of the Dickcissel, *Spiza americana*, all are resident forms although there seems to be more or less local migration controlled by the local food supply. Several of the species congregate in flocks at the close of the breeding season. Some of the flocks are composed of a single species, while others will be made up of several species. This is particularly to be noted among members of the genus *Sporophila*.

Quite a number of species are habitually trapped and kept as cage birds, and nearly all seem to thrive in confinement.

KEY TO THE GENERA, SPECIES AND SUBSPECIES OF FRINGILLIDAE

1. Plumage more or less streaked above or below, or both.
 - a. Tail feathers not acuminate, or if acuminate then tail is shorter than wing.
 - Length 150 mm. or more, wing more than 85 mm. *Sialia* (or *Petro*)
 - Length less than 150 mm. and wing not more than 85 mm.
 - d. Back not distinctly striated and no olive yellow edges to wing and tail quills (faint dusky brownish shaft streaks in the olive-brown feathers of the back of immature or female *Sicalis columbiana* are in combination with olive-yellow edges to wing and tail feathers).

Without olive-yellow wing and tail edgings.

- f.* Entire upper parts a nearly uniform brownish grey; belly and under tail-coverts white..... *Coryphospingus* (female and immature).
- f'.* Upper parts, head and back, dark olive brown, wings and tail black, wing-coverts and tertials edged on outer webs with raw umber; belly whitish under tail-coverts brownish buff (wood brown); or immature males assuming adult plumage, under tail coverts mixed with black feathers with whitish tips..... *Volatinia* (females and immature).
- e.* Olive yellow edgings to wings and tail..... *Sicalis* (female and immature males).
- d.* Back distinctly striated.
- g.* Head not striated; shoulders, lesser and median wing-coverts chestnut..... *Spiza*.
- g'.* Head striated, no chestnut wing coverts.
- h.* Wing short and rounded, outer primary (9th) shorter than 7th..... *M. ...*
- h'.* Wing more pointed and outer primary longer than the 7th.
- i.* Inner secondaries elongated reaching nearly to tips of primaries..... *Sicalis* (immature and females).
- i'.* Inner secondaries and tertials not elongated..... *Sicalis* (adults).
- l.* Tail-feathers acuminate and tail longer than wing..... *Emberizoides* (one species).
- l'.* Plumage not striated, either above or below.
- m.* Having well developed superciliary stripe yellowish, white or grey.
- c.* Well developed black or blackish stripes on sides of crown extending from the bill to the nape.
- d.* Narrow black band across the breast..... *Arremon*.
- d'.* No dark band across the breast..... *Arremonops*.
- e'.* No lateral stripes on crown..... *Saltator*.
- e.* No superciliary stripe.
- c.* Depth of bill at base equal to distance from the angle of rectus to tip of bill..... *...*
- e'.* Depth of bill at base less than distance from angle of the rectus to tip of bill.
- d.* Glossy blue black both above and below..... *Volatinia jacarini splendens* (adult males).
- d'.* Not blue black both above and below.
- e.* A partially concealed crown-patch of bright scarlet..... *Coryphospingus pileatus* (adult male).
- e'.* No crown-patch.
- f.* Outer (9th) primary longer than 7th.
- g.* A white patch at base of outer webs of 5th, 6th and 7th primaries extending beyond tips of coverts
- h.* Under parts yellow..... *Astragalinus psaltria colum...*
- h'.* Under parts white..... *Dolospingus nuchalis*.
- g'.* No white patch at base of outer webs of 5th, 6th and 7th primaries..... *...*
- h.* Inner webs of wing-quills broadly edged with yellow similar to under wing-coverts; size larger, wing more than 65 mm..... *Sicalis flareola*.
- h'.* Inner webs of wing-quills narrowly edged with pale yellowish; smaller, wing less than 65 mm..... *Sicalis columbiana*.
- f'.* Outer primary shorter than the 6th.
- g.* Wing more than 65 mm.
- h.* Wing-tip equal to or longer than tarsus..... *Cyanocompsa rothschildi*.
- h'.* Wing-tip not equal to tarsus.
- i.* Under parts white, throat red (adult) or buff (immature) *Paroaria nigrogenys*.

¹Hellmayr, Novit. Zool. XII, 1905, p. 277.

i'. Under parts not white.	
j. Throat white.	<i>Pitylus grossus</i> .
j'. Throat black.	
k. Under wing-coverts yellow.	<i>Caryothraustes</i> <i>canadensis</i> .
k'. Under wing coverts rose red.	<i>Periporphyrus erythromelas</i> .
g'. Wing not over 65mm., usually less.	
h. Culmen not strongly convex; maxillary tomia nearly straight but with basal portion strongly and abruptly deflected.	<i>Tiaris fuliginosa</i> .
h'. Culmen distinctly strongly convex; maxillary tomia not abruptly deflected at base.	<i>Sporophila</i> .
i. More or less black on head.	
j. Broad white cheek stripe.	
k. Lower throat white, mottled with black.	<i>Sporophila bouvronides</i> .
k'. Lower throat not mottled with black.	<i>Sporophila lineola</i> .
j'. No white cheek stripe, entire sides of head, throat and upper breast black.	<i>Sporophila gutturalis</i> .
i'. No black on head.	
j. Under parts chestnut.	<i>Sporophila minuta minuta</i> .
j'. Under parts not chestnut.	
k. Throat slate grey, no white on cheeks or chin.	<i>Sporophila grisea grisea</i> .
k'. Throat ash grey, chin and base of cheeks white.	<i>Sporophila plumbea whitelyana</i> .

PITYLUS GROSSUS (Linnaeus).

Loxia grossus L., Syst. Nat. ed. 12. 1766. p. 307.

Pitylus grossus Berlepsch & Hartert, p. 24.

The writer did not meet with this species on the Orinoco proper, but specimens were collected for the Tring Museum on the Caura River at Suapure, Nicare and La Pricion; and Klages sent specimens to the American Museum that were collected at La Union during September, October and January.

CYANOCOMPSA ROTHSCILDI (Bartlett).

Guiraca rothschildi E. Bartl., Ann. Mag. Nat. Hist. 1890. p. 168; Hellmayr, Novit. Zool. XII. 1905. p. 277.

Guiraca cayanea rothschildi Berlepsch & Hartert, p. 25.

This species was seen on the upper Orinoco at Munduapo during February, 1899. It has not been seen by the writer on subsequent expeditions. Specimens were collected at La Pricion on the Caura River by André.

ORYZOBORUS CRASSIROSTRIS (Gmelin).

Loxia crassirostris Gm., Syst. Nat. I. 1788. p. 862.

Oryzoborus crassirostris Berlepsch & Hartert, p. 25.

Native name *Pico de plata grande*.

Not common along the Orinoco proper. It was observed, however, at Caicara and at Quiribana de Caicara, being found in the tangle of low shrubs that skirted the belt of heavy timber which marked the course of Quiribana Creek. On the San Feliz River, near its junction with the Cuchivero this species was, however, not uncommon during my visit there in May of 1907. Here it frequented the same character of locality as that about Quiribana de Caicara.

Young males resemble the females. One taken at Las Guacas, on the San Feliz River, May 18th, is in transitional plumage, just assuming that of the adult male. In the wings the 9th, 8th and 5th primaries are new, the others are in the dusky brown of the female, the three outermost secondaries are old succeeded by three new ones which are followed by a single brown quill and lastly two more new black quills. There are scattering black feathers on the back of the neck and top of the head and a few on the throat. The longest of the under tail-coverts are black.

ORYZOBORUS ANGOLENSIS (Linnaeus).

Loxia angolensis L., Syst. Nat. ed. 12. I. 1766. p. 303.

Oryzoborus angolensis Berlepsch & Hartert, p. 25.

Native name *Pico de plata, pico negro*.

Not common. Noted at Altigracia, Caicara, and Quiribana de Caicara along the Orinoco, and on the San Feliz River near its mouth. Like the preceding species the thickets of low shrubs and bushes bordering heavy timber were its favorite haunts. I found it very wary and difficult to approach. A young male just completing the moult in assuming the plumage of the adult male, shows many ochraceous buff feathers on the belly mixed with the new chestnut ones, while on the back are scattering feathers of olive brown mixed with the new black ones.

SPOROPHILA GRISEA GRISEA (Gmelin).

Loxia grisea Gm., Syst. Nat. I. 1788. p. 857.

Sporophila grisea Berlepsch & Hartert, p. 25.

Native name *Pico de plata commun*. Common from the delta region all along the middle stretches of the river to and beyond the falls of Maipures on the upper river.

Male birds in life have the eye varying in color (probably with age) from a dark sepia brown to a seal brown; bill in adults, pale

whitish or flesh color, in immature birds, dusky blackish; feet slaty. Females have the eye dark sepia brown; bill blackish; feet dusky slate color.

Young males resemble the female, and mate and breed before acquiring the plumage of the adult.

A nest with three fresh eggs was taken at Caicara on the 8th of June, 1907. The nest is a frail, thin-walled cup 6.5 cm. in diameter by 4 cm. in depth outside and 5 cm. in diameter by 3.5 cm. in depth inside. It is composed almost entirely of fine rootlets, wood-brown in color, with a scant inner lining of black horse-hair-like vegetable fibres. The side walls and bottom of the nest are so thin and were so loosely put together that the eggs were readily visible from below. The nest was about 3.5 m. from the ground, near the extreme tip of one of the topmost branches of a small tree, the trunk and branches of which were thickly studded with long sharp thorns. It was loosely set on a small horizontal fork. No effort seemed to have been made toward "tying" it to its support.

The eggs approach elliptical ovate in form. The ground color is a dull greyish white. There is considerable variation in the amount and the color of the markings. One of the set is thickly and nearly uniformly covered over the entire surface with small specks and dots of vinaceous cinnamon. In addition there are some overlying spots and blotches of hazel brown, chiefly about the larger end. The other two eggs of the set are much less speckled although there is an abundance of minute dots of pale vinaceous cinnamon, the larger spots and blotches being about as evenly distributed as those in the egg first described, but nearer a pale drab brown than a hazel; in addition there are a few superimposed irregular shaped markings of dark seal brown (almost black) about the larger end.

On the 18th of June a nest with three eggs was collected, also at Caicara. This nest was about 2.7 m. up, between the thorns and thrust against the stem of a small thorny palm. It is less symmetrical in its outline, the walls are somewhat thicker and composed of coarser materials, so loosely woven that the eggs could be seen through the nest bottom. There is no lining of black, hair-like vegetable fibres, as in the other nests. Three eggs were found in this nest, but owing to their advanced state of incubation only two were saved. They are in every way similar in color and markings to the eggs of

the set described above, but are more nearly ovate in shape. They measure 17.5×13.25 and 17.75×13.25 mm. respectively.

SPOROPHILA PLUMBEA WHITELEYANA (Sharpe).

Spermophila whiteleyana Sharpe, Cat. Birds Brit. Mus. XII. 1888. p. 98.

Sporophila plumbea whiteleyana Berlepsch & Hartert, p. 26.

Abundant at Altagracia, midway between Ciudad Bolivar and Caicara, from November to February, 1897-8, when a good series was collected and sent to the Tring Museum. During my first Orinoco expedition the species was not observed at any other points along the river, and none have been secured on succeeding expeditions.

SPOROPHILA MINUTA MINUTA (Linnaeus).

Loxia minuta L., Syst. Nat. ed. 10. I. 1758. p. 176.

Sporophila minuta Berlepsch & Hartert, p. 26.

Common at all points visited along the Orinoco and abundant at Altagracia and at Caicara from January to March during which months the species was usually observed in small flocks, often in company with other members of the genus *Sporophila*. An adult male taken May 17, 1907, on the San Feliz River (near the river Cuchivero) had the eyes seal brown; bill dusky blackish; feet dusky slate.

SPOROPHILA LINEOLA (Linnaeus).

Loxia lineola L., Syst. Nat. ed. 10 I. 1758. p. 174.

Sporophila lineola Berlepsch & Hartert, p. 26.

Messrs. Berlepsch and Hartert identify three specimens collected by the writer at Caicara in 1898 as true *S. lineola*; and specimens sent from Ciudad Bolivar, by Klages as *S. lineola trinitatis*.¹ No specimens of this species have been noted on more recent expeditions.

SPOROPHILA BOUVRONIDES (Lesson).

Pyrrhula bouvronides Lesson, Traité d'Orn. 1831. p. 450 (no locality).

Spermophila bouvronides Léotaud, Ois. Trinidad 1866. p. 318 (Trinidad).

Spermophila ocellata Sclater & Salvin, P. Z. S. 1866. p. 181.

S[permophila] trinitatis Sharpe, Cat. Birds Brit. Mus. XII. 1888. p. 132 (Trinidad).

Sporophila lineola trinitatis Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 26.

¹The proper name for this form is given by H. H. Muller, Novit. Zool. XIII. 1906. p. 58, as *Sporophila lineola* Lesson. See also H. H. Muller, Novit. Zool. XIV. 1907. p. 10.

Sporophila bouvronides Hellmayr, Novit. Zool. XIII. 1906. p. 58; idem. XIV. 1907. p. 8.

This species is nowhere common, but seems to be widely distributed on the Orinoco, where it was noted and collected from Las Barrancas in the delta region and at various other points up as far as the mouth of the Apure River. Of four birds taken at Caicara, three show traces of a white spot on the forehead represented by a number of crown feathers with diamond-shaped median spots. No trace of a white crown spot was seen in other specimens examined.

Birds of this species seem to have a preference for open spaces in the forest rather than the open savanna regions.

Eye seal brown; bill black; feet slate black.

SPOROPHILA GUTTURALIS GUTTURALIS (Lichtenstein).

Fringilla gutturalis Licht., Verz. Doubl. 1823. p. 26.

Sporophila gutturalis Berlepsch & Hartert, p. 26.

Found all along the river from Ciudad Bolivar to above the falls, but nowhere common.

In fresh birds, adult males, the eye is seal brown; bill plumbeous; feet dusky grey.

DOLOSPINGUS NUCHALIS Elliot.

Dolospingus nuchalis Elliot, Ibis 1871. p. 402.

The type of this interesting species, in the American Museum collection, is still the only known example.

VOLATINIA JACARINI SPLENDENS (Vieillot).

Fringilla splendens Vieill., Nouv. Dict. XII. 1817. p. 173.

Volatinia jacarina splendens Berlepsch & Hartert, p. 27.

Common both at Ciudad Bolivar and Caicara. Frequents borders of thickets on the open savanna.

On the 14th of June, at Caicara, a nest of this species was found containing three eggs, all of them pipped. The nest was in a tuft of grass, about 15 cm. from the ground, concealed by overhanging bushes. The eggs are pale bluish white, marked all over, but most thickly about the larger end, with reddish chestnut spots. The one egg saved measured 16.75 x 12.5 mm.

Young males resemble the females. One of the birds taken at Caicara was in transitional plumage, from that of the female to that of the adult male.

ASTRAGALINUS PSALERIA COLUMBIANUS (Lafresnaye).

Chrysomitris columbiana Lafr., Rev. Zool. 1843. p. 292.

Spinus mexicanus columbianus Berlepsch & Hartert, p. 27.

On my first expedition to the Orinoco a fair series, representing birds in adult and in immature plumages, was collected, partly at Altagracia and partly at Caicara. Specimens were collected in December, February, March and June. Only a single example was secured on the two recent expeditions.

SICALIS FLAVEOLA (Linnaeus).

Fringilla flaveola L., Syst. Nat. ed. 12. I. 1766. p. 321.

Sycalis flaveola Berlepsch & Hartert, p. 27.

Native name *Arrocero grande*. Field observations and specimens before me leave no doubt that the adult female of this species is like the adult male. A female taken at Ciudad Bolivar, April 10th, can be distinguished from the male taken at the same place and date only by the presence of faint dusky shaft streaks in the feathers of the back. But three of the apparently adult males taken at Caicara show the same dusky streaks on the back, so that it is not improbable that with age the adult males and females will be absolutely indistinguishable. The series before me also shows that breeding begins before the females have attained the adult plumage. A female taken June 14th was brooding (as indicated by the condition of the abdomen). This bird is a rather light yellowish olive-green above. The feathers of the back are marked with dusky brownish streaks, top of head greyish olive with dusky shaft streaks; wing-coverts like the back; quills and rectrices dusky brownish, edged with the color of the back. Lores and side of face greyish, interspersed with wax yellow feathers; throat and upper breast wax yellow forming a broad band; breast and abdomen greyish white, palest on abdomen where there are a few canary yellow feathers. Under tail-coverts canary yellow; axillaries and under wing-coverts lemon yellow; inner edges of quills pale yellow.

In 1905 a nest of this species, found May 25th, occupied a deserted woodpecker's hole at the top of a dead palm stub about 7.6 m. from the ground. A little dead grass had been taken in as nesting material. Both parents were present, and indistinguishable in color, one from the other. The male was collected (No. 13,732, Geo. K. Cherrie, Caicara, Venezuela). Only one egg, perfectly fresh, was found

in the nest. It is ovate in form, pale bluish white in color, thickly marked all over with specks and spots varying in color from clove brown to olive brown, the lighter colors underlying the darker markings. The egg measures 19.5 by 15 mm.

On my first expedition to the Orinoco I found a nest of this species which from its history is worth recording. This nest was found at Caicara, June 27, 1898. It was a nest within a nest, the original builders having been Orioles (*Icterus xanthornus*), and was first discovered the last of April, at that time new, and containing young Orioles. The entrance then was at the top as is ordinary. After the Orioles left the nest it evidently whipped about in sunshine and rain and the neck or entrance dried and drew together and the nest came to look old and weather worn. But this apparently suited the new house hunters who made a neat small round hole in the body of the nest and carried in some fine soft grass and woody hair-like fibres as a nest lining. The remodelled nest contained three fresh eggs, which was evidently a full set, for the female was shot as she left the nest and dissection proved that no more eggs would have been laid. The nest was about 2.5 m. from the ground. "The eggs resemble those of a sparrow, being white, profusely covered with brown, and a few underlying pale gray spots, the spots almost entirely covering the thick end. They measure 20.5×14.5 ; 21.1×14.5 and 21.1×14.3 mm. and are rather pointed ovate.¹"

In 1907 additional nests and eggs were found, and notes relative to the nesting habits of this species were made as follows:

A set of three partially incubated eggs, collected at Caicara, June 6th, were taken from a nest with a story. One day toward the end of May while passing under the boughs of a tree containing a colony of the yellow-rumped hang-nest (*Cacicus cela*), a nest was picked up that had been broken away from its fellows and had fallen to the ground. It was carried for a short distance and then carelessly tossed among the branches of a tree, where it lodged. Passing that way some days later I was surprised to see a yellow finch fly from the old nest. An examination showed that a lining of soft, dry grasses had been taken in and that the old nest now sheltered new bird tenants.

The eggs found in this nest are similar in color to those described

above. They are ovate, one somewhat elongate, and measure 19.5×14.75 , 19.5×14.75 and 21.5×14.25 mm. respectively.

Another set of eggs collected July 1st, also at Caicara, were taken from a nest found at the bottom of a natural cavity in a large tree. The nest body is composed of strips of soft inner bark mixed here and there with tufts of cotton, while in the lining there is a considerable quantity of horse-hair-like vegetable fibres, the whole compactly woven into a cup that measures 4 cm. in depth by 6 cm. in diameter inside.

The eggs taken with this nest were four in number and perfectly fresh. One is similar in every way to other examples seen and described, but the remaining three are so thickly and uniformly speckled over the entire surface with brown of a shade varying from an olive to a clove brown as almost to conceal the whitish ground color. They measure respectively 19.5×14 , 19.5×14.5 , 19.75×15 and 20.25×14.5 mm.

SICALIS COLUMBIANA COLUMBIANA Cabanis.

Sycalis columbiana Cab., Mus. Hein. I. 1850. p. 147; Berlepsch, Ibis. 1884. p. 433; Berlepsch & Hartert, p. 28.

Native name *Arrocero pequeña*. Common, frequenting the borders of ponds and streams and keeping together in small flocks, except during the nesting season. An adult female taken April 5th had but one foot; the other, having been amputated just below the heel, had healed perfectly.

An adult female (No. 13,943 Cherrie Coll. Caicara, June 19th), is dusky olive brown above with faint shaft lines to the back feathers; head lighter brown; wing-coverts like the back. Edges of outer coverts olive green. Quills and tail-feathers dusky brown, edged with olive yellowish on outer webs. Below, grayish brown, paler on chin and upper throat and whitish in centre of belly; faint dusky shaft streaks on breast and flanks. Under tail-coverts pale yellowish. Axillaries pale yellowish. Under wing-coverts dusky olive yellow.

An immature male taken May 29th resembles the female but is appreciably darker, richer colored above, below a trifle lighter, with the dusky shaft streaks on the breast more prominent. There are a few yellowish-feathers about the corners of the mouth. A second immature male taken June 14th has the upper parts like the female but with brighter olive yellow edgings to wing quills and rectrices.

Cheeks pale brownish, separated from the whitish chin and throat by a narrow dusky brownish submalar streak, sides of breast brownish, paler and inclined to buffy in centre of breast. Belly whitish, flanks buffy yellowish brown with dusky shaft streaks. Under tail-coverts pale yellow.

A specimen in juvenal plumage, taken May 17th, in company with both parents, which were also collected, is olive brown above and wood brown below with paler throat and crissum; the wing and tail quills are similar to those of the adult female but with the olive yellow quill edgings less pronounced.

The parent birds taken with the young described above indicate that the males begin breeding before having acquired the fully adult dress. The male in this case is similar to those described above as "immature" and is in what might be more specifically termed the first nuptial plumage.

Four nests of this species were found on the 1905 expedition. One, which was not taken nor the eggs secured, was placed in the hollow of a horizontal limb about 4.5 m. from the ground. The second, taken June 17th, was in a sand bank in an old nest-hole of the large Kingfisher, *Megaceryle torquata*, 45.7 cm. back from the mouth. The nest, which was rather deeply cup-shaped, was embedded in the sand as though a hole had been scratched for its reception. Inside it measured 2.2 cm. deep by 2.9 cm. in diameter. It is constructed entirely of fine rootlets and dried grass-stems. The four fresh eggs found in this nest are short ovate in form and measure 16.5×13.5 , 17×13.5 and 17×13 and 17×13 mm. respectively. They are pale Nile blue speckled with vandyke and seal brown, the spots forming a ring about the larger end.

The third nest was found June 17th. This was placed about 91.5 cm. up in a crevice between the rocks in a stone wall. The eggs were fresh. One is rounded ovate in shape and the remaining three short ovate. They measure 13×15 , 13×16 , 13×16 and 13.5×16.5 mm. The color is as in the set described above, but the aggregation of spots about the larger ends is not so pronounced. The parent bird was shot as she left the nest and is the adult female described above. A nest found April 28, 1898, at Quiribana de Caicara contained four eggs with incubation far advanced. This nest was situated behind the loose bark of an old rotten stump about 30 cm. from the ground. The nesting materials consisted entirely of soft dry grasses.

Four nests and sets of eggs of this species were collected during the 1907 expedition. The first was taken the 8th of May and the last June 23rd. The eggs collected were fresh in each case. The set taken June 23rd contained five eggs. An interesting coincidence in the collecting of this season was the taking of a nest and set of eggs of this species (June 13th) from the same crevice in a stone wall as the set taken June 17, 1905 and described above.

From our observations and the material at hand we may conclude that the nesting season lasts from the middle of April to the end of June, and sets vary from three to five in number.

SICALIS ARVENSIS MINOR Cabanis.

Sicalis minor Cab., in Schomb. Reise Brit. Guiana III. 1848. p. 670.
Serripopsis arvensis minor Berlepsch & Hartert, p. 28.

Inhabits the open savannas where it is more frequently seen on the ground than perched in the low trees and bushes growing there in scattering clumps. The nest is placed in the tall marsh grass bordering inland ponds or streams.

A nest taken at San Mateo de Caicara May 16th in open swampy land was placed in a thick bunch of grass about 30.5 cm. from the ground. It contained three slightly incubated eggs, ovate in form, pale bluish green in color, two of the eggs being speckled and spotted all over with brown varying in color from vandyke to chocolate, the third with the markings confined chiefly to a distinct ring about the larger end. The eggs measure 16.5×12.75 , 16.75×13 and 16.5×12.5 mm. The nest is rather neat, and compactly built; it is composed entirely of dry grasses, the outside coarse and the lining soft and fine. It measures outside 7.5 cm. diameter by 6 cm. deep; inside 4 cm. diameter by 2.5 cm. deep.

The song of this species is usually given while on the wing. I have frequently seen the male birds spring from the ground and rise to a height of thirty or forty feet, singing as they dropped on fluttering wings.

BRACHYSPIZA CAPENSIS (P. L. S. Müller).

Fringilla capensis P. L. S. Müller, Natursyst. Suppl. 1776. p. 165.
Brachyspiza capensis Berlepsch & Hartert, p. 28.

Two specimens, adult male and female, were taken April 6th, 1898, in a thicket bordering a low range of hills near Quiribana de

Caicara. They were sent to the Tring Museum and recorded in the Berlepsch and Hartert paper. That is the only record I have for this species in over three years' work in the valley of the Orinoco.

MYOSPIZA MANIMBE (Lichtenstein).

Fringilla Manimbe Licht., Verz. Doubl. 1823. p. 25.

Myospiza manimbe Berlepsch & Hartert, p. 28.

Abundant in the open savanna regions. Called *Ratonera* by the natives from its habit of running about between the tufts of grass and concealing itself by crouching down close to the ground.

An adult taken at Ciudad Bolivar, April 4th, had the eye vandyke brown; bill above dusky, below cinereous; feet pale.

A male bird was flushed from a nest found at Caicara May 22, 1905. The nest was on the ground at the foot of a bunch of rather long grass that drooped over and partially concealed it. It was constructed entirely of dry grasses loosely put together. Incubation had just begun in the three delicate, pure white and slightly glossy eggs. The eggs are short ovate in form and measure 18.25×14.5 , 18.5×14.5 and 18.5×14.5 mm.

A second nest and set of eggs¹ of this species was taken at Las Guacas on the San Feliz River (a tributary of the Cuchivero) May 17, 1907. This nest also was on the ground at the foot of a tussock of grass which completely concealed it. The female flushing from almost beneath my feet disclosed the nest, which is an almost perfect sphere of soft dry grasses with the entrance on one side. The nest measures 8.5 cm. in diameter outside, the entrance to the nest cavity about 3.5 cm. in diameter and the nest cavity about 6 cm. The eggs, two in number, were fresh. They are pure white in color, between an ovate and a short ovate in form and measure 19×14.5 and 18.25×14.5 mm.

This species was observed by the writer at all points visited on the Orinoco. Klages sent a series to the American Museum that were collected at Maripa on the Caura River during the months of December, January, February, March and April. These, compared with a series from other points in South America, such as Matto Grosso, Bahia, Bogota, and Apolobamba, Bolivia, seem in every way similar.

¹Allen, Bull. Am. Mus. III. 1891, p. 374, describes two sets of eggs as belonging to this species, but says they are white with a delicate wreath of small spots of blackish brown and purplish lavender around the larger end. The measurements of two eggs are given as ".77 x .56 (10.56 x 22 mm.) and .65 x .55 (11.31 x 14.5 mm.)".

It is possible that some sets of eggs of this species are marked as above, but I am strongly of the opinion that these specimens described by Dr. Allen were incorrectly identified.

ARREMONOPS CONIROSTRIS VENEZUELENSIS Ridgway.

Arremonops venezuelensis Ridgw. Auk. XV. 1898. p. 228.

Arremonops conirostris venezuelensis Berlepsch & Hartert. p. 20.

Not common; keeps to the thickets about the borders of heavy woodland. Has a pleasant song that is usually delivered from the upper branches of some shrub or low tree.

I find in my field notes on my first expedition to Venezuela the record of finding a nest and one fresh egg of this species at Caicara on the 10th of August, 1898. The female was flushed from the nest and collected at the time. The nest was about 30.5 cm. from the ground in a tangle of thorny palm stalks. The opening or entrance was on one side of the somewhat bulky and roughly flask-shaped nest, turned slightly upward and was quite as large as the largest diameter of the nest cavity. The nest measured about 16.5 cm. in diameter by 25.4 cm. high. It was built of the dead blades of broad leaved grasses, sedges and other aquatic plants, lined with soft fine rootlets. The one egg found was white, without gloss, ovate in form and measured 25.5 x 17.7 mm.

ARREMON SILENS (Boddaert).

Tanagra silens Bodd., Tabl. Pl. Enl. 1783. p. 46.

Arremon silens Berlepsch & Hartert, p. 23.

I found this species not uncommon about Maipures on the upper river and collected specimens during December, January, February, March and April. The American Museum possesses birds collected on the Caura in September, October and February. A female taken April 5th had a nearly fully developed egg in the oviduct.

Fresh birds have the eye seal brown; bill black; feet pale grey. The only note I heard from this species was a sharp *pssss*.

EMBERIZOIDES MACROURUS (Gmelin).

Fringilla macroura Gm., Syst. Nat. I. 1788. p. 918.

Emberizoides macrourus Berlepsch & Hartert, p. 29.

Not observed at Bolivar but it was common at Altagracia, Quiribana de Caicara and San Mateo de Caicara in certain restricted localities, such as marshy places, where tall sedge-grass grows on the open savannas. When flushed this bird will only fly for a few yards and then drop into the tall grasses.

SPIZA AMERICANA (Gmelin).

Emberiza americana Gm., Syst. Nat. I. 1788. p. 918.

Spiza americana Berlepsch & Hartert, p. 29.

During my stay at Ciudad Bolivar from April 1st to 17th, 1905, the dickcissel was very abundant in open patches of timber on the savannas and along the water courses. Large flocks containing many males and females were flitting about in the tree-tops. All were singing, and mating seemed to be going on. On my previous expedition I noted the dickcissel at Altigracia and Caicara from the 29th of December until May 10th.

PAROARIA NIGROGENYS (Lafresnaye).

Nemosia nigrogenys Lafr., Rev. Zool. 1846. p. 273.

Paroaria nigrogenys Berlepsch & Hartert, p. 29.

Abundant. The *Gorro colorado* of the natives is one of the characteristic birds of the Orinoco region. It is found everywhere but is not common in heavy timber. Often seen about the door yards of the native houses and in the houses themselves where the birds do not hesitate to enter if the openings at the gables and eaves afford an easy means of escape. They are fond of bits of meat and may be frequently seen helping themselves from the strings of fresh meat that are hung out in the sun to dry, whenever an animal is butchered at a native house.

The colors of fresh birds are: eye light brick red; bill black, grayish at base of the mandible; feet slate color.

The nest is usually placed among the thick branches in the top of some low shrub or tree, or in a tangle of vines, and is ordinarily in the area that is flooded during the rainy season. A nest found at Caicara August 6th, 1898, was in a tree top, but only about eight inches above the surrounding water. The nearest dry land was probably 500 yards from the nest site. This nest was not in any way attached to the surrounding twigs but set loosely in among them. "It is a shallow cup of dry twigs and rootlets, lined with fine smooth grass. The eggs are smooth almost glossless greenish white, covered with blotches and small patches of greenish brown, with a few underlying mauve spots, the markings being more frequent about the thick end. They measure 18.9 x 14.5 and 20.5 x 15 mm." The nest contained three

¹Berlepsch & Hartert, p. 30.

eggs, one fresh and two badly incubated. One of the incubated eggs was broken. Of the measurements given above the smaller is for the fresh egg.

A second nest taken on the same date looks as though it were an old one that had been "refurnished" with a new lining which on one side extends considerably above the edge of the old nest which had tipped to one side. The lining is a fine root-like vegetable fibre (hazel brown in color). The old nest is made up of fine dead twigs, mostly thorny, firmly bound together and attached to the surrounding twigs and vines by spiderwebs. This nest was about 25.3 cm. above the water. The inside measurements are 4.8 cm. in diameter by 2.3 cm. in depth. The two fresh eggs measure 19.5×14.5 and 20.5×14.75 mm. June 5, 1905, a nest was found in the tops of some bushes, about 1.5 m. above the ground, in a marsh, that within another three weeks would have been completely inundated. The body of the nest is composed of fine dead grasses and weed tops firmly bound together and to the surrounding twigs by spiderwebs. The whole is neat, trim and substantial in appearance, although so lightly builded that the eggs are readily seen through the bottom of the nest. There is an inner lining of fine, horse-hair-like black vegetable fibres. The inside measurements are 5.5 cm. diameter by 2.9 cm. in depth; outside 9×5 cm. The nest contained two eggs with incubation far advanced. Only one was preserved, and that measures 20.75×14.5 mm.

In juvenal plumage, this species is a dark sepia brown above, wings and tail brownish black. There are only the faintest indications of paler edges to the feathers of the back and the wing coverts. Below the portion of the cheeks and throat that is crimson in the adult, is a pale ochraceous buff; the remaining under parts are white, faintly buffy on sides, flanks and under tail-coverts.

Succeeding the juvenal plumage, there is a partial moult, in which the sepia brown feathers of the head are replaced, on the centre of the crown largely by ones with brownish black tips and crimson bases, the feathers themselves somewhat lanceolate in form but not markedly elongated. In this stage of plumage the sides of the face, lores and ear-coverts become brownish black; the chin is blackish, and the ochraceous buff feathers of birds in juvenal plumage are largely replaced by rufous with slight intermixture of crimson, the crimson feathers having the lanceolate form of those of adult plumage. The remaining under parts are pale buffy white.

The adult or nuptial plumage seems to be acquired by a complete prenuptial moult and my observations indicate that breeding does not begin until the adult plumage has been acquired.

SALTATOR OLIVASCENS Cabanis.

Saltator olivascens Cab., in Schomb. Reise Brit. Guiana III. 1848. p. 676; Berlepsch & Hartert, p. 23.

Common throughout the delta region and along the middle stretches of the river as far up as the mouth of the Meta River.

Colors of fresh birds are: eye, seal brown; bill, blackish; feet, smoke grey.

Nesting begins in April as indicated by a female taken at Ciudad Bolivar April 15th that had an egg in the oviduct. Immature birds resemble the adults but are washed all over with bright olive green.

SALTATOR MAXIMUS (Müller).

Tanagra maxima Müller, Natursyst. Suppl. 1776. p. 159.

Saltator magnus Berlepsch & Hartert, p. 23, not Gmelin; et auctorum.

This species of *Saltator* was observed on the upper Orinoco only. *S. olivascens* and *S. orenocensis* taking its place on the middle and lower stretches of the river. André and Klages sent specimens from Suapure and La Pricion on the Caura River to the Tring Museum.

SALTATOR ORENOCENSIS Lafresnaye.

Saltator orenocensis Lafr., Rev. Zool. 1846. p. 274; Berlepsch & Hartert, p. 23, Pl. XII, fig. 3.

Common at all points along the Orinoco from the delta region (Las Barrancas) to Urbana or about the mouth of the Apurè River.

An adult male had the eye sepia brown; bill, blackish slate above, plumbeous below; feet, slaty. The colors of an adult female were: eye pinkish cream color; bill greenish drab with a dusky line along ridge of culmen; feet pinkish; flesh white.

On May 10, 1898, I took a nest of this species containing one nearly fully fledged young and one addled egg. The nest was placed among the tops of a thick clump of canes, about 2.13 m. above the ground. It is a large loose structure of broad grasses, sedge and twigs without a particularly soft lining. The single egg reminds one of a large *Carpodacus* egg, being light greenish blue, with a few minute purplish black spots near the thick end. It measures 24 x 17.5 mm.¹

¹Berlepsch & Hartert, p. 23.

Both parent birds remained near while I was collecting the nest and evinced great excitement, frequently breaking into full song. The young bird did not show any fear when I carried it to my camp and readily took food from the hand. It met an unfortunate end a few nights later, being killed by rats.

On the 1907 expedition a nest with two fresh eggs together with the female parent bird was taken at Caicara on the 15th of June. This nest was placed between small upright forks, in the top of a small thorny tree, about 5 m. from the ground. It is loosely, seemingly carelessly, put together, and of somewhat ragged exterior outlines. The nesting material consists of weed stems, broad grasses, a few leaves and strips of soft vegetable fibers (partially disintegrated pieces from the leaves of some species of palm [?]), with a thin layer of somewhat coarse tendril-like plant stems forming the lining. It measures outside about 10 cm. in diameter, and 7 cm. in depth; inside about 6 cm. in diameter at the rim and 4.5 cm. in depth. The eggs are ovate in form, and measure 22.5×18 and 23.75×17.75 mm. They are a bluish Nile in color, one with dots, spots and irregular lines of black arranged in a band about the larger end, the other with a moderately wide band of irregular black lines and marks about the smaller end, and a few scattering black irregular lines and blotches over the body of the egg. Two eggs seem to constitute a full clutch.

CORYPHOSPINGUS PILEATUS (Wied.).

Fringilla pileata Wied, Reise Bras. II. 1821. p. 160.

Coryphospingus pileatus Berlepsch & Hartert, p. 30.

Very abundant at Ciudad Bolivar in the scattering clumps of trees that border the water courses on the savannas; but not observed at any point higher up the river. In the adult male the eye is seal brown; bill above black, below cinereous; feet smoke grey.

ICTERIDAE—CASSIQUES, HANGNESTS, ORIOLES, BLACK-BIRDS.

Seventeen species and subspecies are included in Berlepsch and Hartert's paper, fifteen of which number have been observed and collected by the writer. All are probably resident in the localities where found,

but several of the species are more abundant at some seasons than at others. Or, it is not impossible that the relative abundance or paucity of a given species at any particular season is more apparent than real and is dependent on the habit certain forms have of congregating into great flocks during the dry season. As a group, birds of this family are well known and characteristic of the region. The long purse-like nests of colonies of some of the hang-nests are conspicuous objects in many a landscape. The brilliant plumages of others attract attention, while the vocal powers of certain species are unrivaled among tropical birds.

KEY TO THE GENERA, SPECIES AND SUBSPECIES OF ICTERIDÆ.

- a. Outstretched feet reaching beyond the end of the tail *and* claw of hind toe elongated.
 - b. Outer tail-feathers largely or entirely white. *Sturnella magna meridionalis*.
 - b'. Outer tail-feathers not white.
 - c. More or less red in plumage of under parts (adult males with throat and breast bright scarlet) *Leistes militaris*.
 - c'. No red in plumage of under parts. *Dolichonyx oryzivorus*.
- a'. Outstretched feet falling short of end of the tail *and* claw of hind toe not elongated.
 - b. Black with iridescent lustre (male) or brown (female).¹
 - c. Frontal plumes erect *Lampropsar tanagraus guianensis*.
 - c'. Frontal plumes not erect.
 - d. Size large, wing more than 150 mm. Neck feathers lengthened and expanded.² *Cassidix oryzivora oryzivora*.
 - d'. Smaller, wing less than 150 mm.
 - e. Length of bill *not* more than twice its depth; tail square or but slightly rounded.
 - f. Size large, wing more than 120 mm. *Molothrus ruber*.³
 - f'. Smaller, wing *not* more than 120 mm.
 - g. Wing *not* over 105 mm. *Molothrus atronitens*.⁴
 - g'. Wing more than 105 mm. *Molothrus bonariensis venezuelensis*.
 - e'. Length of bill *more* than twice its depth. Tail much rounded, almost wedge-shaped. *Holotrisca lugubris*.
 - b'. Not uniformly black or brown, above and below.
 - c. Throat uniform with breast and sides *and* general color of under parts olive green, black or brown.
 - d. Entire under parts uniform (black); above, rump bright red. *Cacicus haemorrhous*.
 - d'. Under tail-coverts *not* uniform with breast.
 - e. Rump yellow. *Cacicus cela*.
 - e'. Rump chestnut.
 - f. Body black. *Ostinops decumanus*.
 - f'. Body olive green. *Ostinops viridis*.

¹The females of *Lampropsar tanagraus* resemble the males and are black and slightly glossy.

²Neck feathers not expanded in females.

³In the British Museum Catalogue of Birds, XI. 1886. 338, this species is recorded from Caracas, Venezuela, and Trinidad, so it is not improbable that it will be found later in the delta region of the Orinoco.

⁴Hellmayr, Novit. Zool. XIII. 1906. 20, designates the Coast of British Guiana as the type locality. The species is found in Trinidad, and Venezuela is included in the habitat given in the Catalogue of Birds, British Museum XI. 1886. 337, so we may confidently expect it in the delta region of the Orinoco.

- c'. If throat is uniform with breast and sides *then* general color of under parts is neither black nor brown.
- d. Throat uniform with remaining under parts.
- e. Upper parts bright olive yellowish; wings blackish with pale quill edges and two wing-bars formed by pale tips of greater and middle coverts..... *Icterus xanthornus xanthornus* (juvenal).
- e'. Head yellow; back, wings and tail black..... *Gymnomystax mexicanus*.
- d'. Throat not uniform with remaining under parts.
- e. Lower back and crissum chestnut..... *Gymnostinops yuracares caurensis*.
- e'. No chestnut in plumage.
- f. Throat yellow..... *Xanthosomus ictercephalus*.
- f'. Throat black.
- g. Head all around black..... *Icterus icterus*.
- g'. Top of head yellow uniform with back..... *Icterus xanthornus xanthornus* (adult).

GYMNOSTINOPS YURACARES CAURENSIS Todd.

Cassicus yuracares Lafr. & D'Orb., Syn. Av. H. p. 2; in Mag. Zool. VIII. 1838.

Gymnostinops yuracares Berlepsch & Hartert, p. 30.

Gymnostinops yuracares caurensis Todd; Proc. Biol. Soc. Wash. XXVI. 1913, 170 (Rio Mocho, Rio Caura, Venez.).

The Tring Museum received specimens collected on the Caura River, at Suapure by Klages, and at Nicare by André. None were seen on the Orinoco proper by the writer.

OSTINOPS DECUMANUS (Pallas).

Xanthornus decumanus Pall., Spic. Zool. Fasc. VI. 1769. p. 1.

Ostinops decumanus Berlepsch & Hartert, p. 30.

This species seemed to be confined to the heavily wooded regions above the falls in the Orinoco and the equally heavy forests of the delta region. It was not observed by the writer anywhere below the mouth of the river Meta. A number of trees in the vicinity of Maipures and Munduapo were conspicuous by the number of long nests of this species swinging from their branches.

Beebe collected a female at Guanoco in the delta region.

OSTINOPS VIRIDIS (Müller).

Oriolus viridis Müller, Natursyst. Supplement, 1776. p. 87.

Ostinops viridis Berlepsch & Hartert, p. 30.

Klages sent a specimen from the Mato River mouth (on the Caura River) to the Tring Museum and André sent one from Nicare. It was not observed by the writer.

CACICUS CELA (Linnaeus).

Parus Cela Linnaeus, Syst. Nat. ed. 10. 1758. p. 191.¹

Cassicus persicus Berlepsch, Ibis. 1884, p. 433 (Angostura and Rio Apure).

Cassicus albirostris Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 30.

Native name *Arrendajo*. A common bird all along the lower stretches of the river including the delta region, and along the middle stretches, as far as the mouth of the Meta. Also abundant along the lower Cauca River. Nesting in colonies and frequenting the nesting-trees throughout the year. The colonies vary in size from half a dozen to seventy-five or eighty nests placed close beside one another and at heights above the ground of from 7.6 m. to 30 m. No single species of tree seems to be preferred; but the tree selected and the height from the ground appears to be determined by the presence of the nest of some species of wasp (most frequently *Polybia liliacea* Fabricius), or not uncommonly a nest of stingless bees which forms the centre about which the bird village is built. The most cordial good-fellowship appears to exist between the birds and their insect neighbors. My observations have not indicated any direct relationship between the size of the bird and insect colonies. However, when through accident or natural causes the wasp nests are destroyed or abandoned the surrounding bird colonies seem to dwindle in size and are finally also abandoned. A number of colonies of *Arrendajo* that I noted when on the Orinoco in 1897 and 1898, were still in existence in 1905, some flourishing, others in decadence and some abandoned. And in every instance where a colony had been abandoned or had decreased in population, the wasp nests were either broken down or had been abandoned.

Nesting begins toward the end of the dry season, in April, and continues until June; and what appears to be an intelligent adaptation to circumstances is seen in the finishing of the nests. During the early part of the breeding season, before the rains have begun to come, the nests are almost all open from the top as in the case of our common Baltimore Oriole. As the rains begin to come, after the eggs have been laid, and often the young hatched, the top entrance is gradually roofed over and the nest entrance becomes a bent tube with the opening downward. The nests are purse-shaped bags tightly woven from long, tough, narrow-bladed marsh grasses. Some are provided with an inner lining

¹See Hellmayr. Novit. Zool. XIII. 1906. p. 20.

of soft dead grasses, others are without lining. They average about 38 cm. in length and 15 cm. in diameter, but little constricted at the top.

The colonies are frequently so compact that three and four nests may press one against another and actually be woven one to another.

Two eggs constitute a set and there is considerable variation in shape and size between the various sets, but not between the eggs of individual sets. In five sets that I have before me there are good examples of ovate, elongate ovate and cylindrical ovate. The measurements of the five sets are 26.75×18.5 and 27.5×19.5 ; 27.75×19 and 27×18.75 ; 29.5×17.75 and 31×17.75 ; 27.25×18.5 and 28×18.5 ; 27×18.25 and 28.25×18.75 mm. The color is white with a faint bluish wash, marked with specks, spots and blotches of chestnut over vinaceous brown. In some eggs the markings are pretty evenly distributed over the entire egg; in others they are almost confined to large blotches in a ring about the larger end.

The colors in fresh birds are: eye azure blue; bill pale sulphur yellow; feet black.

CACICUS HAEMORRHOUS HAEMORRHOUS (Linnaeus).

Oriolus haemorrhous L., Syst. Nat. ed. 12. I. 1766. p. 161.

Cassicus haemorrhous Berlepsch & Hartert, p. 31.

This was the only form of *Cacicus* observed on the Orinoco above the falls of Atures and was found there almost as abundantly as was *C. cela* on the lower and middle stretches of the river.

ICTERUS CHRYSOCEPHALUS (Linnaeus).

Oriolus chryscephalus L., Syst. Nat. ed. 12. I. 1766. p. 164.

Xanthornus chryscephalus Berlepsch & Hartert, p. 31.

Native name *Moriche*. Specimens were secured in the vicinity of the first falls in the river, at Perico, and from that point onward up stream. I also noted this species in the trees along the river bank at several points below Ciudad Bolivar. It is somewhat remarkable that it was nowhere observed between Bolivar and the falls of Atures.

Orioles of this species are much sought after as cage birds by the natives and are sold often at from three to ten dollars each.

ICTERUS AURICAPILLUS Cassin.

Icterus auricapillus Cass., Proc. Acad. Nat. Sci. Phila. III. 1847. p. 332.

Xanthornus auricapillus Berlepsch & Hartert, p. 31.

Occasionally observed along the middle Orinoco. Among specimens collected at Caicara was a breeding female which was taken June 7, 1898.

ICTERUS XANTHORNUS XANTHORNUS (Gmelin).

Oriolus xanthornus Gm., Syst. Nat. ed. 13. I. 1788. p. 391.

Xanthornus xanthornus Berlepsch & Hartert, p. 31.

Native name *Gonzalito*. The colors in life are, eye seal brown; bill black; feet plumbeous.

A female in juvenal plumage, collected at Caicara May 4, 1907, is rich dark olive yellow above, darkest on the back; the wings are blackish, the primaries narrowly edged on the outer webs and the secondaries rather broadly edged and tipped with pale greyish; there are two wing-bands produced by pale tips of the greater and median wing-coverts, that on the greater coverts being buffy and the band on the median coverts shaded with the color of the back; the bend of the wing and under parts are canary yellow (without a sign of the black throat patch of the adults); the tail is dusky olive green.

An abundant species; in habits quite like our Baltimore Oriole. In trees where this oriole is nesting are very frequently found nests of one or more species of Flycatchers (*Pitangus*, *Myiozetetes*, *Legatus*, etc.), and not infrequently nests of the *Gonzalito* will be found close to those of a colony of the yellow-rumped Hangnest, *Cacicus cela*. The nests are typical oriole nests, bag-shaped, about 30 cm. long and 10 cm. in diameter at the bottom, slightly constricted at the top. They are usually suspended between forked twigs at the extreme tips of branches. I have found nests within 1.22 m. of the ground, in bushes, and again 15.25 m. up. During my two recent expeditions I noted a number of nests building in small trees over the water that, before the eggs could have been hatched and the young have left the nest, must have been submerged by the rapidly rising river.

A nest taken on the 11th of May, 1907, is somewhat unusual, as it is partially supported by an old nest of the same species, which a month earlier contained young yellow orioles almost ready to fly. Through some cause one of the supporting twigs of the old nest had broken, allowing the nest to sag and partially close the entrance. The new nest is supported by the remaining branch of the fork that held the old nest and also by being woven fast to the old nest itself. While there is no proof that both nests were built by the same pair of birds, yet the choice of the same locality, the construction of nests of the

same relative size and style, and the similarity of the materials employed would all seem to indicate that the orioles had found the locality a desirable one in which to rear a family, and had made preparations for their second brood. This nest was about 7.6 m. from the ground in a large tree standing in a rather thinly wooded savanna region. It contained three fresh eggs; they are elongated ovate in form and in color are white, beautifully marked with dark brown lines and spots over similar underlying pale mauve colored markings, especially about the larger end. They measure 23×15 ; 23.6×15.5 and 22.5×15.2 mm. A set of eggs sent by the writer to the Tring Museum measure 25.1×15.6 and 24.5×17.1 mm¹. A single egg taken with a nest May, 1905, measures 26×17.5 mm. and is nearly elongate ovate in form. Deserted nests of this species are often taken possession of for nesting purposes by other kinds of birds such as *Sicalis flaveola* and the striped Flycatcher, *Legatus albicollis*.

This oriole displays considerable individual taste in the selection of material and in the details of construction of its nests.

ICTERUS ICTERUS (Linnaeus).

Oriolus icterus L., Syst. Nat. ed. 12. I. 1766. p. 161. *pro parte*.

Xanthornus icterus Berlepsch & Hartert, p. 32.

Native name *Trupial*. Adult birds in life have the eye straw yellow, bare skin about eye cobalt blue; bill black, plumbeous at base of the mandible; feet plumbeous.

Not uncommon, but wary and shy; distributed everywhere along the river at least as far as the mouth of the Meta.

Very little has been written regarding the life history of this bird. It is, therefore, with much pleasure that I present the following notes.

A nest and set of eggs was collected at Caicara May 4, 1907. The nest had as its foundation the half decayed mass of grasses that had once served, most probably, as a nest of *Pitangus sulphuratus rufipennis*. Repairs had been made in the roof and a lining of soft grasses had been placed on the bottom of the nest cavity. From the outside there was nothing to indicate that it was more than an old nest long since abandoned. The entrance, the original one, was on one side but completely hidden from below by surrounding foliage. In the same tree were three other deserted nests of *Pitangus*, each of which was in a much better state of preservation than the one that the trupial had selected.

¹Berlepsch & Hartert, p. 32.

The set consisted of three eggs in which incubation had begun. The eggs seem somewhat large for the size of the bird; they are elongate ovate in form and measure 28×18.75 ; 28.5×18.5 and 27.5×18 mm. respectively. In color they are white, with a faint buffy pink shade, rather thickly marked, especially about the larger end, with two or three sets of markings consisting of dots, spots and irregular lines and blotches of brown. The outermost ones are clove brown superimposed on a brown, nearly a burnt umber in shade which overlies an inner set of markings varying in shade from a drab-brown to a smoke grey. Both parent birds were present and evinced much solicitude for their home.

Birds of this species are frequently kept in cages by the natives. In the market place at Ciudad Bolivar they bring fancy prices.

GYMNOMYSTAX MEXICANUS (Linnaeus).

Oriolus mexicanus L., Syst. Nat. ed. 12. I. 1766. p. 162.

Gymnomystax mexicanus Berlepsch & Hartert. p. 32.

Native name *Maizero*. Common from Ciudad Bolivar to the mouth of the Apure. In fresh birds the eye is seal brown, bare skin about eye black; bill black; feet black.

When I reached Ciudad Bolivar in April (1905), great flocks of these birds were to be seen every morning and evening feeding on a swampy piece of ground just back of the city.

A nest with set of eggs was taken at Caicara, May 8, 1907. It is a somewhat thick walled open cup, or bowl-shaped affair constructed of weed and grass stems and having the nest cavity lined with medium coarse rootlets. The materials are loosely, but neatly woven together. The nest measures inside 5.5 cm. in depth by about 8.5 cm. in diameter; outside 11 cm. in depth by 17 cm. in diameter. It was in the top of a *Chaparo* oak amid the thickly tangled branches of a parasitic plant about 6.10 m. from the ground. The eggs, three in number, were fresh. They are between an ovate and a short ovate in form, and measure 26.5×20.5 ; 26×20 and 26.5×20 mm. In color they are a very pale bluish (pale Nile blue) marked chiefly about the larger end, with dots, spots and blotches, of brown varying in shade from a clove-brown, the outermost markings, through burnt umber to drab, the latter underlying the darker markings.

With these eggs was found a single fresh egg of the Venezuelan Cowbird, *Molothrus venezuelensis*.

While the set of eggs and nest above described were being collected both parent birds were present and much excited. No other nests of the species were found in the same neighborhood.

In the American Museum is a series of birds of this species collected at Maripa on the Caura River by Klages during February, May and June.

XANTHOSOMUS ICTEROCEPHALUS (Linnaeus).

Oriolus icterocephalus L., Syst. Nat. ed. 12. I. 1766. p. 163.

Xanthosomus icterocephalus Cabanis, Mus. Hein., 1, 1851. p. 189.

Agelacus icterocephalus Berlepsch & Hartert, p. 32.

Fresh birds have the eye seal brown; bill slate black; feet black.

Common in flocks at Altagracia and at Quiribana de Caicara, from November to January; noted at Caicara once in April. An adult female was collected at Ciudad Bolivar in April; an adult male was taken near the mouth of the San Feliz River on the Cuchivero River the 15th of May. Observed in small numbers above the falls of Maipures during December. Klages sent a pair to the American Museum that were collected on the Caura River near the mouth of the river Meta in January.

STURNELLA MAGNA MERIDIONALIS Selater.

Sturnella meridionalis Sel., Ibis, 1861. p. 179.

Sturnella magna meridionalis Berlepsch & Hartert, p. 32.

Native name *Mochila vacia*. In life the colors are: eye seal-brown; bill black above, mandible and basal part of cutting edge of maxilla plumbeous grey, tip of mandible blackish slate; feet drab grey. Common on the savannas. Habits similar to those of our own Meadow-larks. While *Sturnella* is common on open savanna districts bordering the river all the way from below Ciudad Bolivar to the region above the falls, the birds found on the upper river, from the mouth of the Meta onward, are decidedly smaller and darker colored than those found on the middle stretches of the river.

LEISTES MILITARIS (Linnaeus).

Tanagra militaris L., Syst. Nat. ed. 12. I. 1766. pp. 162, 316.

Leistes militaris Berlepsch & Hartert, p. 33.

Common on the savannas but rather difficult to approach. Not observed farther up the river than the mouth of the Apure.

LAMPROPSAR TANAGRINUS GUIANENSIS Cabanis.

Icterus tanagra Spix. Av. Brasil. I. 1824. p. 67.

Lampropsar guianensis Cab. in Schomb. Reise Brit. Guiana III. 1848. p. 682.

Lampropsar tanagra Berlepsch & Hartert, p. 33.

The writer observed this species only on the upper river above the falls of Maipures, where it was common. Beebe on a recent expedition secured a specimen at Guanoco in the Orinoco delta¹. However, the species has been previously recorded from the same point by Hellmayr.²

I was informed by the natives that this species builds a hanging nest, similar to those of *Cacicus*, but was unable to verify the statement.

CASSIDIX ORYZIVORA ORYZIVORA (Gmelin).

Oriolus oryzivorus Gm., Syst. Nat. I. 1788. p. 386.

Cassidix oryzivorus Berlepsch & Hartert, p. 33.

A single specimen was taken at Caicara June 28, 1898. Not seen elsewhere.

MOLOTHRUS BONARIENSIS VENEZUELENSIS Stone.

Molothrus venezuelensis Stone, Auk. VIII. 1891. p. 347.

Molothrus bonariensis venezuelensis Berlepsch & Hartert, p. 33.

Common in the open country along the lower and middle stretches of the river. At Ciudad Bolivar, in April, it was associating in flocks with *Gymnomystax mexicanus* and *Holoquiscalus lugubris*.

Three breeding females, as indicated by the active condition of the ovaries, collected at Caicara, one May 15th, another June 12th and the third, June 13th, are almost exactly uniform in size. The measurements of the one taken May 15, 1907 (No. 4861, Brooklyn Institute Museum), being wing 102 mm., tail 78 mm., exposed culmen 17 mm., depth of bill at nostrils 8 mm. Above, the three are also almost of identically the same shade of dusky brownish, the individual feathers being brownish black bordered with dusky greyish; below, the three present a quite distinct appearance. No. 4861 (Bklyn. Inst. Mus.), is greyish hair brown, faintly washed on the breast and sides with olive yellowish

¹In the (British Mus.) Catalogue of Birds XI. 1886. p. 389, Trinidad is included in the list of localities. But it is not in Chapman's list nor in that of Hellmayr, Novit. Zool. XIII. 1906. pp. 1-60, not even in his hypothetical list.

²Revision der Spixschen Typen brasilianischer Vögel, München Abh. Ak. Wiss. math.-phys. Kl. 1906 p. 22; Novit. Zool. XIV. 1907. p. 46.

which blends into the color of the chin and upper throat which is olive yellow. No. 4862 (Bklyn. Inst. Mus.), is of a somewhat lighter shade of greyish hair brown; the olive yellowish wash is perhaps a trifle more pronounced, but does not extend on to the chin or the throat which is pale, dusky grey. This specimen is further distinguished from the other two examples by distinct dusky shaft streaks on the feathers of the breast and sides. No. 4863 (Bklyn. Inst. Mus.), is nearly uniform greyish hair brown, with only a trace of olive yellow wash on the breast, and the chin and upper throat scarcely any paler than the belly.

Eggs that are believed to be of this species were taken on two occasions. One, with a nest and set of eggs of *Gymnomystax mexicanus*, was collected at Caicara May 8, 1907. This egg was fresh. It is short ovate in form and measures 22×17 mm. It is thickly spotted with brown varying in shade from hazel to dark chestnut; the lighter markings are overlaid by the darker ones of chestnut; about the larger end the whitish ground color is entirely concealed.

Two fresh eggs taken at Caicara July 2, 1907, with a nest and set of eggs of *Synallaxis cinnamomea*, are short ovate in form and measure 21.5×17 and 21×16.5 mm. They are similar to the single egg described above, but have the entire surface thickly covered with the hazel and chestnut spots but not uniting at any point to conceal the ground color.

HOLOQUISCALUS LUGUBRIS (Swainson).

Quiscalus lugubris Sws., Anim. in Menag. 1838. p. 299; Berlepsch & Hartert, p. 33.

Native name *Tordito*. During my stay at Ciudad Bolivar in April (1905), large flocks of this species of grackle were to be seen feeding in the same localities with *Gymnomystax mexicanus* and *Molothrus bonariensis venezuelensis*. They are gregarious at all seasons. I found a small colony breeding in a swamp near Caicara early in June. The nests were placed in the tops of small cabbage palms, the *Moriches* of the natives, four and five nests often in a single tree. The nests are strongly built, first having a foundation of dead leaves and mud, mixed; then there is a superstructure of rather coarse dead grass and weed stems and a lining of moderately fine dead plant tendrils. The outside measurements of a nest now before me which was collected June 3, 1905,

are about 17 cm. in diameter by 10 cm. in depth; inside it is 7 cm. in diameter by 6 cm. in depth. The eggs, four in number, taken with this nest were fresh. They are typical grackle eggs of a soiled greenish white color, marked with spots, dashes and irregular streaks of blackish brown on an underlying rusty brownish wash. They are ovate in form and measure 25.75 x 18.5; 26.5 x 18.5; 25.5 x 18.5 and 24.75 x 18.5 mm.

Young birds just from the nest were observed on this same date.

The colors of fresh birds are: eye straw yellow; bill and feet black.

CORVIDAE—THE CROWS AND JAYS.

Only two jays have been recorded from the Orinoco region, *Cyanocorax violaceus* and *C. cayanus*. *Xanthura yncas caeruleocephala* is recorded from Trinidad and Venezuela¹ and is consequently included in the following key.

KEY TO THE SPECIES OF CORVIDAE.

a. Upper parts of body (except head and neck) uniform green	<i>Xanthura yncas caeruleocephala</i>
a'. Upper parts not green	
b. Tail uniform, no white tips	<i>Cyanocorax violaceus</i>
b'. Tail feathers tipped with white	<i>Cyanocorax cayanus</i>

CYANOCORAX VIOLACEUS DuBus.

Cyanocorax violaceus DuBus, Bull. Acad. Brux. XIV. 2. 1847. p. 103; Berlepsch, Ibis 1884. p. 438 (Angostura); Berlepsch & Hartert, p. 34.

Native names *Corobero*; *Chua*. A common species, keeping in the tree tops wherever there is tall timber along the water courses; and frequenting groves of mangos, of whose ripe fruit it is very fond. It is noisy and jay-like in its actions.

Colors of fresh birds are: eye seal brown; bill and feet black.

A nest and five fresh eggs were taken at Caicara, April 12th. The nest was about 9.15 m. from the ground in the top of a tree that stood at the edge of a grove of mangos. It was held between upright forks, was somewhat bulky and constructed of quite large, long, dry twigs with a lining of fine root-like vegetable fibres. It was found before completion and visited daily until the five eggs were laid, these being deposited on five consecutive days. They are a bluish white, thickly speckled all over with various shades of brown from vinaceous to

¹Sharpe, Cat. Birds, Brit. Mus. III. 1877. p. 131.

chestnut, the darker markings overlying the others. Ovate in form, the eggs measure 32.5×24.5 ; 33.25×24 ; 34×24 ; 33×24.25 and 32.5×24 mm. respectively.

CYANOCORAX CAYANUS (Linnaeus).

Corvus cayanus L., Syst. Nat. ed. 12. I. 1766. p. 157.

Cyanocorax cayanus Berlepsch & Hartert, p. 34.

According to Berlepsch and Hartert, Klages obtained specimens at Suapure and André at La Pricion on the Caura. None were observed by the writer on the Orinoco proper.

TYRANNIDAE—THE TYRANT-FLYCATCHERS, KINGBIRDS.

Sixty-nine species and subspecies of Flycatchers are included in the present list. Several, however, such as *Ornithion inermis*, *Tyrannulus elatus*, *Myiopagis viridicata viridicata*, *M. gaimardi*, *M. flovivertex*, and *M. cinerea* might better be placed with the *Cotingidae*. But as they were included in my original "key" to the flycatchers they are so retained.

Many of the flycatchers are conspicuous in the *llanos* districts of the Orinoco region, conspicuous alike for their harsh cries, their brilliant colors (particularly bright yellows) and extraordinary nesting habits. As nest builders they have few rivals, certain species constructing delicate lichen covered affairs as tiny and trim as those of some humming birds, others whose nests might serve as models for the weaver-birds, and again the great bulky grass nests, such as those of *Pitangus*, placed in the tree tops are prominent objects in the landscape. But not all are birds of the open *llanos*, many are quiet and retiring both in dress and disposition. These must be sought for in the semitwilight of the thick forest where they flit about, as silent as the shadows, in the undergrowth.

KEY TO THE GENERA, SPECIES AND SUBSPECIES OF TYRANNIDAE.

- | | |
|---|---|
| 1. Tail very long and deeply forked. | <i>Micropus bogotensis</i> |
| a'. Tail not unusually long or deeply forked. | |
| b. Chest barred with olive brown. | <i>Myiodynastes luteiventris</i> |
| b'. Chest not barred. | |
| c. Under parts more or less streaked with dusky or blackish. | |
| d. Wing less than 60 mm. | <i>Todirostrum maculatum</i> . |
| d'. Wing more than 60 mm. | |
| e. A well marked black or blackish auricular stripe. | |
| f. Inner web of tail-feathers broadly edged with rufous. | <i>Myiodynastes maculatus maculatus</i> . |
| f'. Inner webs of tail-feathers not broadly edged with rufous. | |
| g. Upper tail-coverts broadly edged with rufous; inner webs of tail feathers not edged with rufous. | <i>Empidonomus varius</i> . |
| g'. Upper tail-coverts not edged with rufous; inner webs of tail-feathers narrowly edged with rufous. | <i>Legatus albicollis</i> . |
| h. No black or blackish auricular stripe (σ im. or \varnothing). | <i>Pyrocephalus rubinus saturatus</i> . |

- d'. Under parts *not* streaked.
 d. Under parts bright red (adult ♂) *Pyrocephalus rubinus saturatus*.
- d'. Under parts *not* bright red.
 e. Throat, middle of breast and belly nearly uniform white or very pale greyish white. *Tyrannus dominicensis*.
 f. Wing more than 90 mm.
 f'. Wing less than 90 mm.
 g. Wings and tail black (with or without white markings).
 h. Both maxilla and mandible black to the base; rectrices tipped with white. *Fluvicola pica*.
 h'. Mandible pale at base; rectrices *not* white tipped (female).
 g'. Wings and tail dusky brownish or blackish. *Arundinicola leucocephala*
Serpophaga hypoleuca.
- e'. Throat, middle of breast and belly *not* uniform white or very pale greyish white.
 f. General color above and below black or slate black.
 g. Head white (male) *Arundinicola leucocephala*.
 g'. Head *not* white.
 h. Outer primaries acuminate. *Knipolegus pusillus*.
 h'. Outer primaries *not* acuminate. *Knipolegus oenocercus*.
 f'. General color above and below *not* black or slate black.
 g. A prominent white or yellow superciliary stripe *and* wing more than 70 mm.
 h. Superciliary stripe white.
 i. Bill less than 15 mm. from the nostrils to the tip.
 j. No bright colored crown patch. *Conopias inornata*.
 j'. With a bright colored crown patch.
 k. Inner webs of wing-quills edged (broadly) with fulvous. *Myiozetetes cayanensis* *cayanensis*
Myiozetetes texensis columbianus.
 k'. Inner webs of wing-quills *not* edged with rufous.
 i'. Bill *more* than 15 mm. from the nostrils to the tip.
 j. Smaller; wing less than 100 mm. *Pitangus lictor*.
 j'. Larger; wing more than 100 mm.
 k. Culmen strongly decurved from base to tip. *Megarynchus pitangua pitangua*.
 k'. Culmen straight, sharply bent at tip only.
 l. Inner webs of tail-feathers almost entirely rufous. *Pitangus sulphuratus rufipennis*.
 l'. Inner webs of tail-feathers edged (only) with rufous—that color *not* extending to the shafts of the feathers. *Pitangus sulphuratus trinitatis*
Sisopygus icterophrys.
 h'. Superciliary stripe yellow (and wing more than 70 mm.)
 e'. No prominent white or yellow superciliary stripe, *or* wing less than 70 mm.
 h. Rump yellow.
 i. Yellow of under parts suffused with fulvous, and olive green of back less intense. *Myiobius modestus*.
 i'. Yellow of under parts brighter, *not* suffused with fulvous, and back deep rich olive green. *Myiobius barbatus barbatus*.
 h'. Rump *not* yellow.
 i. Width of bill at nostrils equal to or greater than distance from the nostrils to the tip of the bill.
 j. Coronal patch red; general color above rich olive brown, darker on the head. *Platytricus saturatus*.
 j'. Without coronal patch, general color above dark olive green. *Craspedoprion intermedius*.
 i'. Width of bill at nostrils *not* equal to distance from the nostrils to the tip of the bill.
 j. Outstretched feet reaching to or beyond the end of the tail.
 k. Tail *more* than half as long as wing *Todirostrum cinereum cinereum*.
 k'. Tail less than half as long as wing *Perisotrochus ecaudatus*.
 j'. Outstretched feet *not* reaching to the end of the tail.
 k. The three or four outer primaries much reduced in size.
 l. With a well developed crest—three outer primaries reduced. *Colaptes auratus*.
 l'. Not crested—four outer primaries reduced. *Atalapha pilaris venezuelensis*.
 k'. Outer primaries *not* greatly reduced in size.
 l. A more or less prominent sometimes concealed or partially concealed crown patch.
 m. Smaller, wing less than 80 mm.

- n. With pale tips to wing-coverts forming wing-bands.
 o. Wing less than 55 mm. *Tyrannulus elatus*.
 o'. Wing more than 55 mm.
 p. Centre of abdomen bright sulphur yellow—crown patch large bordered laterally with black or blackish. . . . *Myiopagis gaimardi gaimardi*.
 p'. Centre of abdomen pale primrose yellow or pale yellowish white.
 j. Feathers of crown elongated, forming a crest *Elaenia martinica flavogaster*.
 q'. Feathers of crown not elongated into a crest. *Elaenia cristata*.
 r. Centre of belly whitish *Elaenia albiceps parvirostris*.
 r'. Centre of belly pale primrose yellow *Elaenia chiriquiensis chiriquiensis*.
 n'. No wing-bands. *Myiopagis viridicata viridicata*.
 m'. Wing more than 80 mm.
 n. Throat nearly uniform yellow with breast
 n'. Throat grey—not uniform with breast.
 o. Crown patch orange yellow *Tyrannopsis sulphureus*.
 o'. Crown patch scarlet (bordered with orange) *Tyrannus melancholicus satrapa*.
 l'. No concealed or partially concealed crown patch.
 m. Outer webs of outer rectrices pale dirty whitish or pale yellowish.
 n. Above greyish olive brown; below, throat greyish white, belly pale primrose yellow.
 n'. Above dusky olive, below sulphur yellow with a buffy wash on the breast. . . . *Xenopsaris albinucha*.¹
 m'. Outer webs of outer rectrices not conspicuously lighter colored than the inner webs.
 n. Bright olive green above.
 o. Pileum slate grey in marked contrast with olive green of back.
 p. Larger; tail about equal to wing (Trimodal) *Leptopogon superciliosus*.
 p'. Smaller; tail less than wing. *Todirostrum schistaceiceps*.
 o'. Pileum not slate grey, or if grey or dusky not in sharp contrast with olive greenish back.
 p. Abdomen bright tawny olive. *Pipromorphus olivaceus olivaceus*.
 p'. Abdomen not tawny olive.
 q. Throat distinctly grey rather than yellow or olive yellow. *Pipromorphus olivaceus pallidiventris*.
 q'. Throat yellow or yellowish olive.
 r. A distinct yellow or yellowish superciliary streak. *Ornithion pusillum napaeum*.
 r'. No superciliary stripe.
 s. Throat and breast olive yellow.
 t. Mandible blackish horn-color, whitish at base only. . . *Rhynchocyclus sulphureus kragi*.
 t'. Mandible nearly uniform from tip to base (pale dusky horn-color.)
 u. Darker, pileum and hind neck deep slate color *Rhynchocyclus sulphureus similis*.
 u'. Paler, pileum and hind neck slate grey *Rhynchocyclus sulphureus flaviventris*.
 s'. Throat and breast chrome or brown yellow with a faint ochraceous wash. *Rhynchocyclus flaviventris flaviventris*.
 n'. Not bright olive green above.

¹This is out of place here, as *Xenopsaris* belongs with the *Cotingidae*.

6. Belly and crissum bright ochraceous buff.	<i>Terenotriccus erythronus erythronus.</i>
7. Belly not ochraceous buff.	
7'. Pileum black or blackish in rather marked contrast with the olive green back and both maxilla and mandible black.	<i>Myiarchus tuberculifer.</i>
8'. Pileum not black nor blackish in marked contrast with the olive green back; or else mandible pale.	
9. Inner webs of rectrices edged with rufous.	<i>Myiarchus tyrannulus.</i>
9'. Inner webs of rectrices not edged with rufous.	
10. Throat and upper breast grey not separated by a darker band of olive or olive greyish from the yellow or pale yellow of the belly.	
11. With more or less well defined wing-bands formed by light tips to greater and median coverts.	
12. Tips to wing-coverts cinnamon brown.	<i>Pharomysias murina incompta</i>
12'. Tips to wing-coverts pale greyish or buffy white.	<i>Sublegatus brevirostris glaber.</i>
13'. No well defined wing-bands.	<i>Myiarchus ferox venezuelensis</i>
14'. Breast olive or olive greyish separating grey of throat from pale yellowish or whitish of belly.	
15. With prominent well defined cinnamon brown wing-bands.	<i>Empidonax cabanisi</i>
16. If wing-bands are present they are not cinnamon brown (pale whitish, yellowish or dusky).	
17. Mandible almost wholly black or blackish.	<i>Empidonax arenaceus.</i>
17'. Mandible almost wholly pale or dusky.	
18. Middle of belly and crissum a rather bright pale yellow.	<i>Empidonax lateralis.</i>
18'. Middle of belly and crissum only faintly if at all washed with yellowish.	
19. Tarsus less than one-fifth as long as wing.	<i>Myiochanes brachydactylus</i>
19'. Tarsus more than one-fifth as long as wing.	<i>Elanoides cristata.</i>

FLUVICOLA PICA (Boddaert).

Muscicapa pica Bodd., Tabl. Pl. Enl. 1783, p. 42.

Fluvicola pica Berlepsch & Hartert, p. 34.

Native name *Viudita*. Common, frequenting the edges of ponds and streams and keeping to the low underbrush.

Not observed above the mouth of the Meta.

In life the eye is seal brown; bill and feet black.

Birds in immature plumage have the primaries and secondaries dusky brownish with the white tips and edgings that are so prominent in the adults, nearly obsolete; top of head blackish with brownish wash;

back dusky sepia brown, the feathers with greyish bases; the longer upper tail-coverts with blackish or brownish tips.

ARUNDINICOLA LEUCOCEPHALA (Linnaeus).

Pipra leucocephala L., Mus. Ad. Frid. II. Prod. 1764. p. 33.

Arundinicola leucocephala Berlepsch & Hartert, p. 34.

Less common than the preceding species, and like that species lives near the water especially in grassy marshes with scattering clumps of bushes and trees where it is as likely to be seen in the tree tops as among the bushes. It is active and flycatcher-like in habits.

Adult birds have the eye seal brown; bill black above, yellowish below with the tip blackish; feet black. Young males resemble the female.

A just completed nest of this species was found at Caicara on the 19th of May. It was in the top of a small dead *Moriche* palm-tree about 7.6 m. from the ground. Built of soft dry grasses, it was globular in form and about 18 cm. in diameter, with a small round entrance hole in the middle on one side. Unfortunately no eggs had been deposited when I cut the palm. Close beside the birds' nest was a nest of wasps. A second nest of *Arundinicola leucocephala* in process of construction was placed in the upright forks of a low shrub that grew near the edge of an extensive marsh. The nest was about 91.5 cm. from the ground, just above the top of the long marsh grass surrounding the bushes.

PYROCEPHALUS RUBINUS SATURATUS Berlepsch & Hartert.

Pyrocephalus rubinus saturatus Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 34 (Type, Altagracia, Orinoco River, Venezuela).

Native name *Sangre de Toro*. Common, frequenting the clumps of trees in open savanna regions.

In the neighborhood of Caicara I found many nests of this species. They were usually in scrub oak from 1.52 m. to 3.5 m. from the ground, nearly always at forks well away from the body of the tree, and usually on one of the larger lower limbs. In no instance have I found them in any way concealed by surrounding leaves. The nests are neatly rounded, shallow cups set loosely in the forks of the supporting limbs. The materials used are rather short bits of dead grass, weed-stems and twigs, all presenting a brownish gray color in close harmony with the grayish bark of the supporting branches. There is an inside lining

of small feathers with an occasional bit of gray lichen. A nest before me, collected on the 19th of May, measures inside 4.5 cm. in diameter by 1 cm. in depth. I have never found more than two eggs in a nest. In a set, taken April 29th at Quiribana de Caicara, they are short ovate in form, pale bluish white in color marked with two sets of rather large spots about the larger end. The underlying spots are cinereous, the superimposed ones blackish brown. They measure 17.75×13.75 and 18×14.2 mm.

Nesting birds are very confiding. I have on several occasions touched a brooding female before she would leave the nest.

OCHTHORNIS LITTORALIS (Pelzeln).

Elainea littoralis Pelz., Orn. Bras. 1868. pp. 108, 180.

Ochthornis littoralis Berlepsch & Hartert, p. 35.

Only one specimen observed, an adult female taken at Bichaco midway between the mouth of the river Meta and the falls of Atures, September 18, 1898. Specimens have been taken also on the Caura River, at Suapure and La Pricion by Klages, and at Nicare by André.

SISOPYGIS ICTEROPHRYS (Vieillot).

Muscicapa icterophrys Vieill., Nouv. Dict. XII. 1817. p. 458.

Sisopygis icterophrys Berlepsch & Hartert, p. 35.

Only the single specimen, recorded by Berlepsh and Hartert, was collected; an adult female taken at Altigracia, September 19, 1898. Not again observed.

KNIPOLEGUS ORENOCENSIS Berlepsch.

Cnipolegus orenocensis Berlepsch, Ibis. 1884. p. 433. Pl. XII. (Angostura); Berlepsch & Hartert, p. 35 (Ciudad Bolivar, Venezuela).

The type of this species came from Ciudad Bolivar (Angostura), where specimens were secured on the last Museum expedition, but it was observed more frequently about Altigracia and at Caicara; it was not noted beyond the mouth of the Meta River.

A bird in juvenal plumage taken at Agua Salada de Ciudad Bolivar, April 13th, is a dark dusky olive brown above: the wings and tail brownish black narrowly edged with pale brownish (raw umber); greater and median wing-coverts tipped with raw umber brown; below greyish hair brown, belly brownish or buffy brownish white.

The fresh colors of adult birds are: eye seal brown; bill plumbeous; feet black.

This species frequents the thickets bordering the streams and ponds. Its actions are much like those of *Sayornis*.

KNIPOLEGUS PUSILLUS Sclater & Salvin.

Cnipolegus pusillus Scl. & Salv., Nomencl. Av. Neotr. 1873. p. 158; Berlepsch & Hartert, p. 36.

Observed only in the vicinity of the falls of Atures where two males that were sent to the Tring Museum and recorded by Berlepsch & Hartert, were taken in September, 1898.

MACHETORNIS RIXOSA FLAVIGULARIS Todd.

Tyrannus rixosus Vieill., Nouv. Dict. XXXV. 1819. p. 85.

Machetornis rixosa Berlepsch & Hartert, p. 36.

Machetornis rixosa flavigularis Todd., Ann. Carnegie Mus. VIII. 1912.

p. 210 (Type ♂, Tocuys, Lara, Venezuela, in Carnegie Museum).

Native name, *Pajaro amarillo jinetero*. A common, although not abundant species, inhabiting the open and sparsely wooded savanna regions. While it is neither noisy nor brilliant in plumage, its curious habit of keeping on the ground close about domesticated animals, as they wander about the savannas and open commons of the villages, is certain to attract attention. Or, if not intent on capturing the insects that are constantly fluttering up from the grass, these birds are sure to be seen contentedly riding about on the back of some animal. About Altagracia and Caicara I observed them riding on the backs of dogs, pigs, cattle, horses and burros.

A female taken May 9th was brooding.

Adult birds have the eye saturn red; bill black; feet blackish.

Not observed above Caicara.

PLATYTRICUS GRISEICEPS (Salvin).

Platyrhynchus griseiceps Salv., Bull. B. O. Club, VII. 1897. p. 15; Berlepsch & Hartert, p. 37.

Specimens were sent from points on the Caura River to the Tring Museum by Klages from Suapure, and by André from Nicare and La Pricion.

PLATYTRICCUS MYSTACEUS INSULARIS (Allen).

Platyrrhynchus insularis Allen, Bull. Am. Mus. Nat. Hist., II 1889. p. 143 (Type, Tobago).

Platyrrhynchus mystaceus Berlepsch & Hartert, p. 37 (Caicara on the Orinoco and La Pricion on the Caura River).

Platyrrhynchus mystaceus insularis Hellmayr, Novit. Zool., XIII, 1906, p. 22 (Caicara, Orinoco).

Platytriccus insularis Ridgway, Proc. Biol. Soc. Wash., XVIII, 1905, p. 211.

Mr. Hellmayr in his paper on the Birds of Trinidad¹ considered the birds from the Orinoco (Caicara), as intermediate between the typical *mystaceus* and *mystaceus insularis*, but the series in this Museum and that of the American Museum does not confirm that opinion. I am unable to find any differences between birds from Caicara (on the upper river), or birds from Las Barrancas (in the delta region), and birds from Trinidad.

Adult birds have the eye seal brown; bill, maxilla black, and mandible pinkish flesh color; feet delicate greyish flesh white, claws greyish white. In an immature male taken at Las Barrancas August 3, 1907, both mandible and maxilla are blackish.

This little flycatcher frequents the undergrowth in heavily wooded districts.

PLATYTRICCUS SATURATUS (Salvin & Godman).

Platyrrhynchus saturatus Salv. & Godm., Ibis. 1882. p. 78; Berlepsch & Hartert, p. 37.

On the writer's first expedition to the Orinoco, a single specimen was collected at Nericagua above the falls of Maipures; this and specimens collected by André at La Pricion on the Caura, were recorded by Berlepsch and Hartert (*l. c.*).

TODIROSTRUM CINEREUM CINEREUM (Linnaeus).

Todus cinereus L., Syst. Nat. ed. 12. I. 1766. p. 178.

Todirostrum cinereum Berlepsch & Hartert, p. 37.

Common, frequenting second growth clearings, and the thickets and low trees on the borders of open savannas.

Adults have the eye straw yellow; bill black above, whitish below; feet plumbeous.

¹ Novit. Zool. XIII 1906, p. 22.

Three nests and sets of eggs were taken at Caicara in 1905. The first set of eggs, collected May 11th, shows more variation than the others. Two of the three eggs are ovate in form and one is elongate ovate. They are white without gloss, two of them with a few tiny brownish spots on the larger end, the third with the larger end sparsely marked with wood-brown spots. The eggs of this set measure 10×11 ; 17.25×11 and 16.5×11.25 mm. On the 18th of June two sets of three eggs each were taken. One set is white without any markings, ovate in form and measure 10.25×11.15 ; 10.75×11.15 and 15.75×11.5 mm. One of the eggs of the second set, taken on the 18th, has a very few tiny brownish spots about the larger end, the other two are without markings. These are ovate in form and measure 15.75×11.25 ; 10×11.5 ; and 10×11.5 mm.

The three nests display considerable individuality in the respective builders both in the selection of materials and in the details of construction, although the general characteristics are the same in each case. In another place¹ I have described nests of this species that were taken in Costa Rica, and the descriptions there given would apply equally to the ones from the Orinoco before me now.

Two adult females taken April 1st and 3rd respectively, at Ciudad Bolivar, show small white partially concealed crown spots formed by white bases to some of the crown feathers.

This species was not observed beyond Caicara.

TODIROSTRUM MACULATUM (Desmarest).

Todus maculatus Desmarest, Hist. Nat. Tang. 1805. (hab. "Guiane").

In the collection made by Mr. C. Wm. Beebe at Guanoco, Orinoco delta, is an example of this species.

TODIROSTRUM SCHISTACEICEPS Selater.

Todirostrum schistaceiceps Schl., Ibis, 1859. p. 444; Berlepsch & Hartert, p. 37.

Only a trifle less common than *T. cinereum*, but unlike that species it frequents the undergrowth of the heavily forested regions, and while common at Caicara and points higher up the river it was not seen anywhere below that point.

In life the eye varies from a sepia to a chocolate brown; bill black; feet drab grey.

¹VIK-VII, 1890, p. 133.

On our last expedition three nests and sets of eggs together with the parent birds were collected. All were found in the neighborhood of Caicara. The first taken June 15th contained two fresh eggs. One is elongate ovate the other ovate in form. They measure 17.5×12 mm. and 16×12.2 mm. respectively. In color they are white with a slight creamy tinge, marked about the larger end with small dots and irregular blotches of brown, varying from a light hazel to a dark chestnut.

The nest looks exactly like a handful of broad-leaved drift grasses suspended from the tip of a slender drooping twig. The structure is 45 cm. in length and 12 cm. in greatest diameter where the nest cavity is situated. There is no extension built out over the entrance to the nest cavity such as is seen in nearly all nests of *T. cinereum*, but only the round entrance partially concealed by loose blades of dead grasses hanging down over it. The grass blades forming the outer covering on the upper half of the nest all hang straight down over the sides, forming a perfect thatch. I imagine that the structure will shed water perfectly. The nest cavity is shallow, hollowed only a little below the entrance. There is a nest lining of fine soft grasses. This nest was suspended barely 75.72 cm. above the ground. It was in the centre of a thicket of undergrowth in the heavily forested belt of timber along the river bank.

The parent birds were exceedingly shy, and not until after an hour's waiting was I able to make sure of the owner's identity and to collect the male parent.

The second nest was found June 19th. It contained only one egg and that with incubation far advanced. This egg is ovate in form and measures 17×12 mm. The ground color is similar to the two described above, but the markings consist of tiny dots and some larger spots of dark chestnut brown scattered over the entire surface of the egg, but most thickly about the larger end. The nest was in the centre of a thicket that bordered a pool of water in the thick forest. It was suspended from the extreme tip of a slender twig, that bent out over the water, and only about 91.5 cm. above its surface.

The female parent was seen to fly from the nest, and was then collected.

The third and last nest collected was taken June 29th. It contained two eggs in which incubation was far advanced. One egg is ovate; the other is longer, nearly an elongate ovate. The two eggs measure 17.25×12.5 mm. and 18.5×12.5 mm. respectively. They are a little

more heavily marked than the first set. The nest was located in a locality exactly similar to that last described.

From this material it would seem that two eggs is the normal clutch for this species. The three nests are very similar to one another.

TAENIOTRICCUS ANDREI Berlepsch & Hartert.

Taeniotriccus andrei Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 38.
(Type, La Pricion, Caura River, Venezuela, Tring Museum).

The type of this species, collected by Mr. André is, I believe, unique. The specimen, now in the Tring Museum, was taken at La Pricion, on the Caura River, February 18, 1901.

PERISSOTRICCUS ECAUDATUS (Lafresnaye & D'Orbigny).

Todirostrum ecaudatum Lafr. & D'Orb. in Mag. Zool. VII. 1837. p. 47
(Yuracares, Bolivia).

Orchilus ecaudatus Berlepsch & Hartert, p. 39 (Munduapo, Upper Orinoco and Suapure on the Caura River, Venezuela).

Perissotriccus ecaudatus Oberholser, Proc. U. S. Nat. Mus., XXV, 1902, p. 64.

Only a single specimen of this species has been taken by the writer in the Orinoco region. An adult male was taken at Munduapo on the upper Orinoco, March 15, 1899, and Klages collected an example at Suapure on the Caura River. Colors of the fresh bird were, eye sepia brown; bill black; feet mouse grey.

ATALOTRICCUS PILARIS VENEZUELENSIS Ridgway.

Colopteryx pilaris Cab.; Berlepsch & Hartert, p. 39. (Points on the Orinoco, Ciudad Bolivar, Altigracia, Caicara, Quiribana de Caicara, Maipures.)

Atalotriccus pilaris venezuelensis Ridgw., Proc. Biol. Soc. Wash., XIX. 1906. p. 115.

Common in the thickly wooded areas along the river banks from Ciudad Bolivar to above the falls of Maipures.

Adults have the eye straw yellow; bill blackish with pale edges and extreme basal part of the mandible pale; feet cinerous gray.

COLOPTERYX GALEATUS (Boddaert).

Motacilla galeata Bodd., Tab. Pl. Enl. 1783. p. 24.

Colopteryx galeatus Berlepsch & Hartert, p. 39.

This, like the preceding species, is found all along the river from Ciudad Bolivar to beyond the falls of Maipures, but is much less common.

HABRURA PECTORALIS BREVIPENNIS Berlepsch & Hartert.

Habrura pectoralis brevipennis Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 40.

This must be a very rare form in the Orinoco region. The writer secured the type specimen at Caicara, April 26, 1898. It was the only example taken during that expedition and none have been since met with.

The type is said to differ from *H. pectoralis* in having shorter wings, only.

Mr. Ridgway¹ has suggested that "*Habrura* might not be out of place in the Cotingidae," but some recent studies of my own of the tarsi of Mesomyodian birds, chiefly flycatchers, have persuaded me that for the present at least *Habrura* may be safely left with the Tyrannidae.

INEZIA² CAUDATA (Salvin).

Capsiempis caudata Salvin, Bull. Brit. Orn. Club. VII. No. 48. 1897. p. xvi. (Ourumee, Brit. Guiana); Ibis. 1898. p. 154 (reprint); Ridgway, Birds N. & M. Am. IV. 1907. p. 467.

Capsiempis caudata Sharpe, Hand-list III. 1901. p. 117.

Serpophaga orinocensis Berlepsch & Hartert, p. 40 (Altagracia, Caicara, Quiribana de Caicara, Orinoco, Venez.)

Serpophaga caudata (Salvin), apud Hellmayr, Novit. Zool. XIII. 1906. p. 3-3.

Inezia caudata Cherrie, Sci. Bull. Mus. Bklyn. Inst. I. No. 16. 1909. p. 390.

A not uncommon species in sparsely wooded savanna regions and the borders of heavy timber. It was observed and collected at various points from Las Barrancas, in the delta region, up as far as Munduapo beyond the falls of Maipures.

In life the eye is straw yellow; bill black, slate grey at base of mandible; feet slate grey.

This species was properly removed from the genus *Capsiempis* by Mr. Hellmayr (*vide supra*), but it certainly can not be referred to

¹Birds of North and Middle America, IV. 1907. p. 332.

²Sci. Bull. Mus. Bklyn. Inst. I. 1909. p. 390.

Serpophaga. Inesia caudata and *I. subflava* differ widely from the typical species of *Serpophaga* in the style of coloration, being olive green above and yellowish below, and in the absence of a concealed vertical crown spot. The character of the tarsal envelope is also quite distinct, being taxaspidean.¹

As I have already pointed out (Sci. Bull. I. 1909. p. 390), in fresh specimens of *Inesia* the acrotarsium is seen to cover the anterior half of the tarsus only, on the inner side extending back a little farther than on the outer side. "The upper posterior third of the back of the tarsus seems to be entirely nonscutellate, but on the distal two-thirds is a double series of small elongated scutella, one on each side."

INEZIA SUBFLAVA (Sclater & Salvin).

Serpophaga subflava Sclater & Salvin, Nomencl. Av. Neotr. 1873. p. 158 (Pará, Brazil); Sclater, Cat. Birds Brit. Mus. XIV. 1888. p. 105.

Serpophaga subflava Berlepsch & Hartert, Novit. Zool. IX. 1902. 40-41, in part ("Munduapo," upper Orinoco, Venezuela).

Berlepsch and Hartert (*l. c.*), called attention to the differences between specimens from the middle Orinoco and an example from Munduapo on the upper Orinoco, a difference which seems to be borne out by the series in this museum from the middle and delta regions and a single example from Nericagua on the upper river. And Mr. Hellmayr² who made a comparison between the type of *subflava* and a series of *I. caudata* seemed to find exactly those differences pointed out by Berlepsch and Hartert, and to be observed in the specimens before the writer.

I. caudata is distinguished from *I. subflava* by slightly longer wings and tail, by having the lower throat and upper breast suffused with fulvous, the whitish chin spot spreading on to the upper throat, and belly paler yellow.

SERPOPHAGA HYPOLEUCA Sclater & Salvin.

Serpophaga hypoleuca Scl. & Salv., P. Z. S. 1866. p. 188; Berlepsch & Hartert, p. 41.

On the three expeditions I have made to the Orinoco region, only six of these rare little Flycatchers have been collected. Specimens were

¹Fresh specimens of *Serpophaga hypoleuca* that have been examined, have the acrotarsium extending across the outer side, to and, for the distal two-thirds, around on to the back; on the inside it extends about half way across. The area between the edges of the acrotarsium on the back and inner posterior half of tarsus is occupied by a series of elongated quadrate (better described as oval, perhaps) scutella. On the posterior outer half of the tarsus, above that portion of the acrotarsium extending on to the back, is a single quadrate scutellum, and above that a nonscutellate triangular area.

²Novit. Zool. XIII. 1906. p. 323.

taken at San Mateo de Caicara, Altagracia, and Agua Salada de Ciudad Bolivar. It was found only in the open, sparsely wooded savanna regions.

PIPROMORPHA OLEAGINEA OLEAGINEA¹ (Lichtenstein).

Muscicapa oleaginea Licht., Doubl. Verz. 1823. p. 55.

Mionectes olcagineus Berlepsch & Hartert, p. 41.

Pipromorpha oleaginea Cabanis & Heine, Mus. Hein. II. 1859. p. 55.

Rare on the Orinoco proper where only a single specimen has been collected by the writer. That was taken at Nericagua above the falls of Maipures in April, 1899. It is apparently not uncommon on the Caura River as it was there obtained by both André and Klages. In the American Museum are four specimens collected on the Caura River by Klages, two from La Union taken in October, and two from Suapure, taken in November.

The *Pipromorphae* inhabit thick woods and frequent the low trees and bushes therein.

CAPSIEMPIS FLAVEOLA (Lichtenstein).

Muscicapa flaveola Licht., Doubl. Verz. 1823. p. 56.

Capsiempis flaveola Berlepsch & Hartert, p. 41.

A not common species, but one found all along the river from Las Barrancas in the delta to above the falls of Maipures.

Fresh birds have the eye seal brown; bill above black, mandible pale at base; feet slate.

PHAEOMYIAS MURINA INCOMTA (Cabanis & Heine).

Elanena incomta Cab. & Heine, Mus. Hein. II. 1859. p. 59 (Cartagena).

Phaeomyias incomta Berlepsch & Hartert, p. 41 (Orinoco, Venezuela; Altagracia, Caicara, Ciudad Bolivar).

A common species frequenting sparsely wooded savanna regions along the middle Orinoco from Ciudad Bolivar to beyond the mouth of the Apure. Specimens have been collected at Ciudad Bolivar, Agua Salada de Ciudad Bolivar, Altagracia, and Caicara.

Eye seal brown; bill above blackish, below dusky with blackish tip; feet slate black.

A nest with the male parent bird was collected at Caicara May 8,

¹ It is probable that *P. pallidirostris*, the Trinidadian *Pipromorpha* will be found in the coast region of the Orinoco delta.

1907. The nest was saddled between the forks of a small branch at the extreme top of a *Chaparo* Oak which stood in the open savanna. It was about 6.10 m. from the ground. When found, one young bird was perched on the edge of the nest but flew away and was lost when I started to climb after the nest. The nest is a shallow, open, cup-shaped affair, resembling somewhat nests of the wood-pewee (*Myiochanes virens*), or more perhaps that of *Pyrocephalus* or *Sublegatus*. It is a slight affair, loosely saddled in the forks, composed of rather short pieces of fine grass stems and other vegetable fibres with which are mixed many empty spider egg cases. The whole is held together largely with spider-webs. The inner lining consists of a few feathers and more empty spider egg cases. Outside it measures 2.8 cm. in depth by 6 cm. in diameter; the nest cavity measures 1.3 cm. in depth by 4.2 cm. in diameter.

ORNITHION INERME Hartlaub.

Ornithion inerme Hartl., J. F. O., 1853, p. 35 (locality unknown¹); Berlepsch & Hartert, p. 42 (Suapure, Caura River, Venezuela).

Rare. Not observed by the writer (on first trip), but in Berlepsch and Hartert's paper a single specimen is reported collected at Suapure on the Caura River by Klages. In the Brooklyn Museum is a specimen collected by the writer at Maipures in December, 1905. In this example the eye was clay color; bill above black, below slate color; feet blackish slate.

ORNITHION PUSILLUM NAPAEUM (Ridgway).

Myiopatris pusilla Cabanis & Heine, Mus. Hein., II. Sept. 1859, p. 58 (Cartagena, Colombia).

Ornithion napaeum Ridgway, Proc. U. S. Nat. Mus., X. 1888, p. 520 (Diamantina, lower Amazon Valley).

Ornithion pusillum Berlepsch & Hartert, p. 42 (Suapure and La Pricion, Caura River; Altigracia, Caicara, Ciudad Bolivar, Orinoco River, Venezuela).

Common throughout the savanna regions. Young birds are much paler, more cinereous below than the adults.

Iris seal brown; bill blackish, pale at base of the mandible; feet dusky slate gray.

¹Berlepsch & Hartert (l. c.), substitute Bahia.

TYRANNULUS ELATUS ELATUS (Latham).

Sylvia elata Lath., Ind. Orn. II. 1790. p. 549.

Tyrannulus elatus Berlepsch & Hartert, p. 42.

Rare. Specimens were collected at Altagracia, Maipures and Nericagua.

TYRANNISCUS GRACILIPES Sclater & Salvin.

Tyranniscus gracilipes Berlepsch & Hartert, p. 43.

A female of the species was collected at Maipures on the upper river December 18, 1898. No others noted.

ELAENIA MARTINICA FLAVOGASTRA (Thunberg).✓

Pipra flavogaster Thunb., Mem. Acad. Imp. St. Petersb., VIII. 1822. p. 286.

Elainca pagana Berlepsch & Hartert, p. 43.

Native name *Capiton*. The same name is applied to all species of the genus and frequently to others of the small dull colored Flycatchers. Common from the delta region up at least to the first falls, frequenting the sparsely wooded savannas. The nesting season about Caicara occurs in April. The nest is usually saddled well out toward the tip of a limb of a scrub oak and rarely over 1.83 m. or 2.44 m. from the ground, often not over 91.5 cm. It resembles the nest of our wood-pewee, but with fewer lichens ornamenting the outside. It is a neat, compact little cup lined with feathers. A nest containing two slightly incubated eggs, collected at Quiribana de Caicara, April 17th (No. 10,766 Coll. G. K. and Stella M. Cherrie), was placed near the end of a limb in a scrub oak about 1.5 m. from the ground. Both parents remained very near, while the nest was being collected, chirping uneasily. The nest measures about 7 cm. outside diameter and 5.5 cm. inside, by 1.7 cm. in depth. The two handsome eggs are rather short ovate in form, of a rich cream color, marked with irregular spots of reddish brown overlying pale mauve-colored markings. In one of the eggs the markings are arranged chiefly in an irregular band about the larger end, in the other the markings are confined chiefly on the larger end itself. The measurements are 22.5 x 17 and 21 by 10.5 mm.

ELAENIA CHIRIQUENSIS CHIRIQUENSIS Lawrence.

Elainca chiriquensis Lawrence. Ann. Lyc. Nat. Hist. N. Y. VIII. 1865. p. 177 (Type ex David, Chiriqui in U. S. Nat. Mus.).

Elacnia albivertex Berlepsch, Proc. IVth Internat. Orn. Cong., 1905. p. 402.

On my first expedition to the Orinoco region a single specimen of this species was collected at Quiribana de Caicara¹ but was not included in Berlepsch and Hartert's paper. In 1905 an adult male and an adult female were taken at Ciudad Bolivar, April 3rd.

ELAENIA CRISTATA Pelzeln.

Elainea cristata Pelz. Orn. Bras. 1868. pp. 107, 177; Berlepsch & Hartert, p. 43.

This and the preceding species occur together throughout the middle stretches of the Orinoco. Specimens were collected at Ciudad Bolivar, Agua Salada de Ciudad Bolivar, Caicara and Quiribana de Caicara. A nest and set of eggs were taken at Quiribana de Caicara April 16th, 1898, and described in the Berlepsch and Hartert paper.

ELAENIA PARVIROSTRIS Pelzeln.

Elainea parvirostris Pelz., Orn. Bras. 1868, pp. 107, 178.

Elainea albiceps parvirostris Berlepsch & Hartert, p. 44. (Caicara, Quiribana de Caicara.)

Common, noted at various points along the river from Caicara down as far as Las Barrancas in the delta region. Only two specimens of this species were taken on my first expedition to the Orinoco. One of the two collected at that time, together with a nest and set of eggs, was taken on the 2nd of April. Both the nest and the eggs resemble those of other species of *Elaenia* that have come under my observation, except that the nest-lining used by *E. cristata* and the present species is composed of the soft, silky hair-like fibres covering the seeds from the silk cotton tree, whereas feathers are usually employed.

Specimens from Caicara and from Las Barrancas have been compared with the type of *Elaenia albiventris*² in the collection of the American Museum and found to be identical.

MYIOPAGIS VIRIDICATA VIRIDICATA (Vieillot).

Sylvia viridicata Vieillot, Nouv. Dict. XI. 1817. p. 171 (Type, Paraguay).

Elainea viridicata Berlepsch & Hartert, p. 44. (Caicara and Quiribana de Caicara, Orinoco River, Venezuela.)

Elaenia viridicata delicata Berlepsch³ Proc. IVth Internat. Orn. Cong., 1907, p. 430 (Caicara and Quiribana de Caicara, Orinoco River). *

¹Berlepsch, Proc. IVth Internat. Orn. Cong. 1905, p. 49.

²*Elaenia albiventris*. Chapman, Auk. XIV. 1897, p. 698. Type, Cumana, Venezuela, W. H. Phelps Collection.

³Count Berlepsch writes me under date of Dec. 5th, 1908, that his *E. v. delicata* is true *viridicata*!

Elainca placens Authors, cf. Sci., Cat. Birds, Brit. Mus. XVI. 1888. p. 148.

Not uncommon about Caicara where they frequent the sparsely wooded savanna regions.

MYIOPAGIS GAIMARDI (D'Orbigny).

Muscicapara gaimardii D'Orb., Voy. dans l'Am. Merid., IV. Ois. 1839. p. 326 (Yuracares, Bolivia).

Elainca gaimardi Berlepsch & Hartert, p. 44 (Caicara, Maipures, Munduapo, Orinoco River, Suapure and La Union, Caura River, Venezuela).

*E[lainopsis]*¹ *gaimardii* Ridgway, Birds N. and M. Amer., IV. 1907. p. 800 (Santa Marta, Colombia, Venezuela, Trinidad, Brazil).

MYIOPAGIS FLAVIVERTEX (Sclater).

Elainca flavivertex Scl., P. Z. S. 1887. p. 49; Berlepsch & Hartert, p. 45 (Munduapo, Orinoco River, Venezuela).

This species was met with on my first expedition only. In the neighborhood of Munduapo it was not uncommon. It is easily distinguished from *M. viridicata* by its smaller size, and the deeper, richer, olive green above, deeper yellow on the belly and heavier wash of olive on the lower throat and upper breast. The yellowish tips to the greater and median line coverts forming two well defined bands are also distinctive.

MYIOPAGIS CINEREA (Pelzeln).

Elainca macilvaini Berlepsch & Hartert (not Lawrence), Novit. Zool. IX. 1902. p. 44 (Saupure, Caura River, Venezuela).

Elainca cinerea Pelz., Orn. Bras. II. 1870. pp. 108, 180; Berlepsch & Hartert, p. 45 (Saupure, Caura River, Venezuela).

E[lacnia] *cinerea* Hellmayr, Novit. Zool., XV. 1908. p. 47 (Suapure, Caura River, Venezuela).

This species was not observed on the Orinoco proper by the

¹Mr. Ridgway in a paper in the proceedings of the Biological Society of Washington. XVIII. 1905. pp. 207-210, describing new genera of *Tyrannidae*, *Pipridae* and *Colingidae*, removes *Elainia elegans* Pelzeln (= *Muscicapara gaimardii* D'Orbigny) from the *Tyrannidae* and constitutes it as the type of a new genus (*Elainopsis*) of *Colingidae*, on the ground that it has pycnospidean tarsi and that the basal phalanx of the middle toe is wholly united to the outer toe. However, I find these characters shared by all the species of *Myiopagis* that I have examined—*viridicata*, *flavivertex*, *macilvaini* and *cinerea*.

writer, but two specimens were sent to the Tring Museum by Klages which were collected at Suapure on the Caura River. One of these was identified by Berlepsch and Hartert as *Elainca macilvaini* but Hellmayr has shown it to belong to this species.

SUBLEGATUS GLABER Sclater & Salvin.

Sublegatus glaber Scl. & Salv., P. Z. S. 1868, p. 171. Pl. XIII, fig. 2.

Sublegatus brevirostris glaber Berlepsch & Hartert, p. 45. (Ciudad Bolívar, Atagracia, Caicara, Orinoco, Venezuela).

An abundant species on the sparsely wooded savanna, from Ciudad Bolívar as far as the mouth of the Apure. A nest and two eggs were taken at Quiribana de Caicara, April 15th (No. 1075 Coll. G. K. and Stella M. Cherrie). In general characters the nest is similar to nests of *Pyrocephalus* or *Elaenia*. A neat, compact, although rather frail cup saddled on a horizontal limb usually at a fork where a broader foundation is available. Short bits of thin dry bark and plant stems, held together by cobwebs, form the body of the nest and there is a lining of a few soft feathers. The inside measurements are 5 cm. diameter, by 1.3 cm. in depth. The eggs are ovate in form; thickly marked with irregular seal brown spots that overlie other spots of a pale lavender color, all on a ground color of bluish white. In one egg the spots are pretty uniformly distributed over the entire egg, in the other they are confined chiefly about the larger end. The measurements are 17.5×13.5 and 17×13 mm.

A nest which, together with a set of eggs and the female parent, was taken at Agua Salada de Ciudad Bolívar, April 15th, was placed on and between the forks near the tip of a horizontal branch of a scrub oak, and only about 1.8 m. from the ground. The body of the nest seems to be made up almost entirely of short bits of the thin paper-like outer bark of the scrub oak, or *guaramal*; held together and attached to the supporting branch by spiders' webs. There is a scant lining of short pieces of fine wire-like, thin, dead grass stems, a few bits of soft bark and more cobwebs. The nest is a shallow open cup measuring 6.5 cm. outside diameter by 4.5 cm. inside and only 2.5 cm. outside depth. Being constructed of the same sort of bark as the supporting branch it is very inconspicuous.

The parent bird sat so closely that my hand almost touched her before she fluttered away. Incubation was far advanced in the two

eggs—so far that I was able to save only one. It is rather short ovate measuring 18.25×13.75 mm. The color and markings are similar to those described above. The markings are massed chiefly in a circle about the larger end.

A male in juvenal plumage taken at Caicara, June 8, 1905, (No. 13,844 Cherrie Coll.), is dark brown (nearly a clove brown) above, wings and tail darker. Feathers of the back and head narrowly tipped with buffy brownish. Wing-coverts rather broadly tipped and tertials tipped and edged on the outer webs, with the same color. Throat and upper breast brownish gray, slightly mottled by buffy tips to the feathers; remaining under parts including under surface of the wing a primrose yellow. Eye grayish brown; bill and feet blackish.

In adult fresh specimens the eye is vandyke brown or seal brown; bill is black or blackish; feet slate black.

In the American Museum is a single specimen from Maripa on the Caura River (Klages Coll.).

S. glaber is probably replaced in the delta regions by the following species.

LEGATUS ALBICOLLIS ALBICOLLIS¹ (Vieillot).

Tyrannus albicollis Vieillot, Nouv. Dict. XXXV. 1819. p. 89.

Legatus albicollis Berlepsch & Hartert, p. 45.

A not uncommon inhabitant of the strips of woodland bordering the smaller streams of the savanna regions.

Fresh birds have the eye seal; bill and feet black.

A young bird 24 to 48 hours old had the skin of the back jet black, that below reddish flesh color. The natal down is a tawny russet with olive shade.

The nesting season in the middle Orinoco region occurs during April and May. Some six or eight nests of this species have come under my observation, and in each case they have been in trees in which other species of birds were nesting. Two of the nests examined, taken at Quiribana de Caicara April 8th and 14th, 1898,

¹Mr. Ridgway in characterizing the genus *Legatus* (Birds of North and Middle America, IV. 1907. 438), says:—tarsus "typically exaspidean." However, a careful examination of the specimens in the series in this Museum indicates that the tarsus is far from typically exaspidean; rather it is pycnaspidean, or perhaps it would be better described as quasi taxaspidean. The acrotarsium extends across the outer side of tarsus, but apparently does not overlap the posterior edge at any point. The broad planter space between the edges of the acrotarsium is occupied on the posterior edge by three series of small roundish scutella or granules between which and the inner edge of the acrotarsium is a narrow area of non-scutellate integument.

(No. 10,768, 10,769 Coll. G. K. & Stella M. Cherrie) were apparently year-old, abandoned nests of the common yellow Oriole (*Icterus xanthornus*). A few small dead leaves of the *Salada* tree formed a lining, but whether they had been carried in by the birds or had fallen there by chance seemed open to question. The first of these nests contained a single egg, the second contained two eggs. In each case the parent birds were collected, the female taken with nest No. 10,768 Cherrie Coll. having an egg in the oviduct. A nest without eggs, together with the owners, taken at Caicara, May 4, 1905, is exactly similar in materials employed and style of structure with another nest of *Icterus xanthornus*, containing eggs, that hung within a few feet of it in the same tree. Also in the same tree were nests containing eggs of *Pitangus derbianus rufipennis* and *Myiozetetes superciliosus columbianus*.

An egg collected with the nest (one originally built by the yellow Oriole), and female parent bird at Auga Salada de Ciudad Bolivar April 17, 1907, is ovate in form and measures 22×15 mm. The oviduct of the female contained two imperfect eggs indicating that the full set would have been three. On the 7th of May, at Caicara a nest containing one egg just on the point of hatching and a day old chick, was collected; the full set in this case was evidently two.

MYIOZETETES CAYANENSIS RUFIPENNIS Lawrence.

Myiozetetes rufipennis Lawrence, Ann. Lyc. N. Y. IX. p. 267. (Type, Puerto Cabello.)

Myiozetetes cayennensis rufipennis Berlepsch & Hartert, p. 45.

M[yiozetetes] cayanensis rufipennis Hellmayr, Novit. Zool., XV, 1908, p. 49 (N. Venezuela, Orinoco Valley).

M[yiozetetes] c[ayanensis] rufipennis Hellmayr, P. Z. S., 1911, p. 1134. (Ciudad Bolivar, Altigracia, Caicara, Quiribana de Caicara, Orinoco River).

Native name *Pecho amarillo*, a name applied to all the yellow-breasted flycatchers.

An abundant species throughout the sparsely wooded portions of the savanna regions.

Adults have the eye dark sepia brown; bill and feet black.

Young birds in juvenal plumage are dark brown with a faint olive wash above; head black without colored crest, broad superciliary

stripes, white, faintly washed with yellowish, meeting across the forehead and extending backward almost uniting in a band across the occiput; wings and tail blackish; edges of outer webs of wing-coverts, and quills, outer and inner webs of tail feathers, and tips of feathers of lower back, rump and upper tail coverts, rufous; below, including under wing-coverts, bright yellow; throat white; inner webs of wing feathers, except at tips, rufous (juvenal male, Caicara, Venezuela, June 8, 1905, Geo. K. Cherrie, No. 3577, Brooklyn Institute Museum).

Adults in fresh nuptial plumage show rufous edges to the tail feathers.

The nesting season along the middle Orinoco begins early in April and continues into June. The nests are large, loosely woven ragged looking balls of plant fibres and soft grasses, with a large entrance hole on one side. They are usually placed near the ends of large horizontal limbs and rarely more than 3.48 m. from the ground. Two or three (rarely four) eggs are laid; they are speckled and spotted with reddish brown, with a few underlying pale purplish gray patches in some specimens. Usually the markings are confined to a zone about the larger end, but occasionally are quite evenly distributed over the entire surface. The ground color varies from a delicate white to a faint pinkish buff. The form varies from ovate to elongate ovate. A set of three eggs collected at Caicara May 10, 1907 (No. 14,735 Cherrie Coll.) measure 23.5×14.75 ; 22.5×14.5 and 22×14.7 mm. A set of two taken in the same locality, June 21st (No. 14,983 Cherrie Coll.) measure 23×15 and 23×15 mm.

MYIOZETETES TEXENSIS COLUMBIANUS Cabanis & Heine.

M[yiozetetes] columbianus Cab. & Hein., Mus. Hein. II. 1859. p. 62.

Myiozetetes texensis columbianus Berlepsch, Ibis, 1884. p. 434 (Angostura).

Myiozetetes superciliosus columbianus Berlepsch & Hartert, p. 46 (Ciudad Bolivar, Altigracia, Orinoco, Venezuela).

Abundant from the delta region up to some distance beyond the mouth of the Caura River. In 1897 and 1898 I found it common at Altigracia, midway between Ciudad Bolivar and Caicara. Not at all common at Caicara. Like the preceding species, it is an inhabitant of the thinly wooded savannas.

In life the eye is light brown to seal brown; bill and feet black.

Birds in juvenal plumage resemble the adults, but are without

the scarlet crown patch and the wing and tail quills and wing-coverts are edged with ochraceous or ochraceous rufous.

A nest containing three fresh eggs was collected at Caicara May 4, 1905. The nest was about 9.14 m. from the ground in the same tree with nests of *Legatus*, *Pitangus* and *Icterus*. In the location, shape and materials employed, it is similar to nests of *M. cayanensis cayanensis*, globular mass of plant fibers and long-bladed grass, placed near the end and pressed in between the forks near the tip of a large horizontal limb. The entrance about 5 cm. in diameter is on the side looking toward the end of the limb. In getting the nest down two of the eggs were broken. The remaining egg is ovate in form, delicate flesh pink in color, quite thickly speckled about the larger end with reddish brown spots overlying other spots of vinaceous brown. The egg measures 20.5 x 19.5 mm. In 1907 sets of eggs were collected April 9th and May 8th.

The nests and eggs of this species are indistinguishable from those of *M. cayennensis*.

MYIOZETETES GRANADENSIS Lawrence.

Myiozetetes granadensis Lawr., Ibis, 1862. p. 11.

Myiozetetes granadensis subsp.?; Berlepsch & Hartert, p. 46.

This species was not observed by the writer; André, however, sent a single example, collected at La Pricion, on the Caura River, in February, 1901, to the Tring Museum. It is recorded in the Berlepsch and Hartert paper.

TYRANNOPSIS SULPHUREUS (Spix).

Muscicapa sulphurea Spix, Av. Bras. II. 1825. p. 16, Pl. 20.

Myiozetetes sulphureus Berlepsch & Hartert, p. 46 (Quiribana de Caicara, Orinoco River).

Tyrannopsis sulphureus Ridgway, Proc. Biol. Soc. Wash., XVIII, 1905, p. 209.

On my first expedition to the Orinoco this species was found.

Not uncommon about Quiribana de Caicara during April. Not noted elsewhere.

CRASPEDOPRION OLIVACEUS GUIANENSIS (McConnell).

Rhynchocyclus olivaceus guianensis McConnell, Bull. Brit. Orn. Cl. XXVII; 1911; 106 (British Guiana).

Craspedoprion intermedius Todd, Ann. Carnegie Mus. VIII; 1912; p. 207 (Rio Yuruan, a tributary of the Guyuni Riv., Venezuela) La Lajita, Rio Mato.

C[raspedoprion] guianensis Chapman, Bull. A. M. N. H. XXXIII; 1914; 176 (Caura and Yuman in Venezuela).

This species is recorded from La Lajita, Rio Mato (a tributary of the Caura).

RHYNCHOCYCLUS KLAGESI Ridgway.

Rhynchocyclus klagesi Ridgway, Proc. Biol. Soc. Wash. XIX; 1906; p. 115 (Type ex Maripa, Venezuela).

Besides the type there is in the American Museum collection a specimen from the foot of Mount Duida, Upper Orinoco.

RHYNCHOCYCLUS SULPHURESCENS SULPHURESCENS (Spix).

Platyrrhynchus sulphureus Spix, Av. Bras. III. 1825. p. 10. Pl. 12, fig. 1.

A single adult male was collected at Caicara May 13, 1907. The species was not observed on either of the previous expeditions, nor is it included in Berlepsch and Hartert's list.

Eye yellowish; mandible delicate flesh pink; feet slate color.

RHYNCHOCYCLUS SULPHURESCENS ASSIMILIS Pelz.

Rhynchocyclus assimilis Pelzeln, Orn. Bras. (1869); p. 110, p. 181.

Rhynchocyclus sulphureus assimilis Berlepsch 4th Internat. Orn. Congress 1907; p. 482.

The American Museum collection contains a specimen from the "Foot of Mount Duida," Upper Orinoco, collected by Miller and Iglseder.

RHYNCHOCYCLUS POLIOCEPHALUS SCLATERI Hellmayr.

Rhynchocyclus poliocephalus sclateri Hellmayr, Verh. Zool.-bot. Ges. Wien. LIII. 1903. p. 207. (Type, Barra de Rio Negro) Nericagua and Maipures, Orinoco River, and Suapure and La Pricion, Caura River, Venez., and other points: Hellmayr, Novit. Zool. XIII. 1906. p. 86.

Rhynchocyclus poliocephalus Berlepsch and Hartert, p. 47. (Nericagua and Maipures, Orinoco River; Suapure and La Pricion, Caura River, Venezuela).

Only observed on the upper river where specimens were collected at Maipures and Nericagua from December to March. Klages and André sent specimens to the Tring Museum from the Caura River.

RHYNCHOCYCLUS FLAVIVENTRIS FLAVIVENTRIS (Wied).

M[uscipeta] flaviventris Wied. Beitr. Naturg. Bras. III. 1831. p. 929.
Rhynchocyclus flaviventer (nec. Spix) Berlepsch & Hartert, p. 46.

Common, frequenting the edges of heavy timber land and the larger, denser areas of woodland that here and there dot the savannas.

In life the eye is drab brown; bill black above, pale flesh color below; feet slate color.

The nesting season in the middle Orinoco region extends from the last of April to the end of July. The nest is suspended from the extreme tip of some slender branch hanging from the limb of a tree or low bush, occasionally hanging within 15.24 cm. of the ground and rarely over 1.52 m. up. A nest taken at Caicara, June 10th, was suspended at the extreme tip of a slender twig, about 1.52 m. up and hanging directly over a forest path that was much frequented by cattle. It is pouch-shaped, or perhaps better described as retort shaped, (especially the interior cavity), about 20 cm. in length and 8 or 9 cm. in diameter at the bottom or bulbous portion. It is suspended by being tightly tied about the tip of the supporting twig. The entrance, which is from below, is a tube about 6 cm. in diameter, which hangs 10 cm. below the bottom of the nest proper. The materials used are soft, fine dry grasses and vegetable fibres; the whole neat and trim in appearance. A nest taken May 5th is less trim in appearance and the entrance tube hangs about 20 cm. below the bottom of the nest and is carried out at an angle of 30° from the perpendicular. Also on the opposite side of the nest from the entrance tube there hangs a bunch of dead grass making the outlines of the hanging nest that of an inverted V with the apex solid.

The eggs, two or three (usually the latter number) constituting a set, vary in form from ovate to short ovate. In color they are creamy white speckled about the larger end with rufous brown spots and dots and some grayish or lavender underlying spots. A dozen eggs representing six sets average 19.9 x 13.5 mm. The smallest is 18.25 x 13.25 mm. and the largest 21 x 14.2 mm.

Three nests of this species collected within a few days of one another, and in the same general locality (within an area of a circle, the radius of which would not exceed 75 metres) seem to the writer excellent examples of the individual tastes of birds. Each nest is constructed of material distinct not only in its character but also in its color. The various materials from my observations seemed equally abundant, yet one nest is constructed entirely of black fibers and each of the others of a distinct shade and texture of grayish brown fibers. Not only was the character and color of the materials employed in each case distinct, but the builders displayed individual taste in the execution and style of the exterior of the nest structure.

RAMPHOTRIGON RUFICAUDA (Spix).

Platyrrhynchus ruficauda Spix, Av. Bras. II. 1825, p. 9. Pl. 11, fig. 1.

Ramphotrigon ruficauda Berlepsch & Hartert, p. 47.

The writer obtained a single specimen, an adult female at Mundupo, March 15th, 1899. No others were observed. Specimens were, however, collected by both Klages and André on the Caura River at Suapure and La Pricion respectively, and there is a single example in the American Museum, collected at La Union, Caura River, by Klages.

CONOPIAS INORNATUS (Lawrence).

Myiozetetes inornatus Lawr., Ann. Lyc. Nat. Hist. N. Y. IX. 1869, p. 268.

Conopias inornatus Berlepsch & Hartert, p. 47.

A not uncommon species frequenting the sparsely wooded savanna regions occasionally in company with species of *Myiozetetes*. It was observed at various points from Ciudad Bolivar up as far as Caicara.

Eye dark brown; bill black; feet blackish.

A nest and set of eggs together with the female parent bird were collected at Caicara May 6th, 1907. The nest is an open, cup-shaped affair, closely resembling that of our wood-pewee (*Myiochanes virens*). It was saddled on to the forks of a good sized limb, about 4.57 m. from the ground. The tree in which it was placed stood just at the edge of a belt of heavy timber bordering the river. The nest walls seem to be composed almost entirely of grey lichens that are bound together by cobwebs. There is a somewhat scant lining of fine

brownish-colored, vegetable fibers interspersed with bits of grey lichens. The whole is neat and trim in appearance. The measurements are: outside diameter at base 9.3 cm.; height 3.5 cm.; inside diameter 5.7 cm.; depth 2 cm. The eggs are short ovate, white with a faint buffy tinge marked with a few spots and blotches of chestnut brown about the larger end. They measure 21×16 mm. and 21.25×16 mm. The female parent was collected, and dissection showed that no more eggs would have been deposited. Two therefore constitute a full set.

PITANGUS SULPHURATUS RUFIPENNIS (Lafresnaye).

Saurophagus rufipennis Lafr., Rev. Zool. III. 1851. p. 471.

Pitangus derbyanus rufipennis, Berlepsch, Ibis, 1884. p. 434 (Angostura).

Pitangus derbianus rufipennis Berlepsch & Hartert, p. 47 (Ciudad Bolivar, Altagracia and Caicara, Orinoco River).

Native name *Christofue*. Common throughout the savanna regions. Adults have the eye seal brown; feet and bill black.

The nesting season in the middle of the Orinoco region lasts from early April until the end of June. The nests built by this species are modelled on the same plan as nests of *Myiozetetes* as described, but are very much larger and the materials employed are much coarser. A nest, together with three eggs and the parent birds, taken at Caicara, May 3rd, was about 4.57 m. from the ground. It is a great, rough, ragged-looking ball of grass and weed stems, the body of which measures about 30 cm. in diameter. There is an elliptical entrance hole on one side, the minor axis of which measures about 5 cm. and the major about 9 cm. The dead grass immediately about the nest cavity and entrance hole is soft and fine. The nest was well out toward the end of a large horizontal limb, pressed in between forks that supported it from below and on the sides. The three eggs taken with this nest were slightly incubated. There is a noticeable variation in size and shape. One egg is ovate, one a short ovate and the other intermediate between them. They are a rich cream color with seal brown specks and spots, and a lesser number of underlying drab spots, grouped in an irregular zone about the larger end. Measurements 26.5×19 ; 27.5×20.5 and 29.5×20.5 mm.

A second set of three badly incubated eggs, taken on the same date, are similar in color and markings, and measure 28.3×26 ; 30.8×20 and 29×19.8 .

In a set of four fresh eggs, taken May 4th, there are many large irregular spots in the markings which are clustered on the larger end. These eggs measure 28.2×19.5 ; 27.5×20 ; 27.7×19 and 27.1×19.7 mm.

In the same tree with the nest containing the last set of eggs above described, were nests of *Icterus*, *Myiozetetes* and *Legatus*, and it was the rule rather than the exception to find nests of the present species and those of *Icterus xanthornus* not far from one another in the same tree.

PITANGUS SULPHURATUS TRINITATIS Hellmayr.

Pitangus sulphuratus trinitatis Hellmayr, Novit. Zool., XIII. 1906. p. 24.
(Type "♀". Coparo, Trinidad.)

This form of *P. sulphuratus* was found at Las Barrancas; *P. s. rufipennis* is found throughout the dryer savanna regions of the middle Orinoco and is probably replaced in the entire delta region by *trinitatis*.

PITANGUS LICTOR (Lichtenstein).

Lanius lictor Licht., Verz. Doubl. 1823. p. 49.

Pitangus lictor Berlepsch & Hartert, p. 48.

Birds of this species were found frequenting the edges of the narrow belts of timber bordering the watercourses that cross the open savannas.

Eye seal brown; bill black; feet slate black.

MYIODYNASTES MACULATUS MACULATUS (Müller).

Muscicapa maculata Müller, Natursyst. Supplement, 1776. p. 169.
("Cayenne").

Myiodynastes audax Berlepsch & Hartert, p. 48. (Caicara and Quiribana de Caicara, Orinoco and Suapure, Caura River, Venezuela.)

This species was observed from Ciudad Bolivar up as far as Caicara. It was not observed in heavily wooded districts.

An immature male collected June 10th differs from the adult only in the absence of a concealed yellow crest.

In adults the eye is seal brown; bill black, pale at base of the mandible; feet slate color.

A female taken at Caicara May 8th had in the oviduct an egg ready to be deposited. On the same date a nest from which the young were just emerging was found. It was a natural cavity in the trunk of a *Chaparo* oak, about 3 m. up. The tree stood at the edge of an open savanna.

MEGARHYNCHUS PITANGUA (Linnaeus).

Lanius pitangua L., Syst. Nat. ed. 12. I. 1766. p. 136.

Megarhynchus pitangua Berlepsch & Hartert, p. 48.

Not uncommon, noted from the delta region as far up the river as San Fernando de Atabapo.

Eye vandyke brown; bill and feet black.

The juvenal plumage is similar to that of the adult, but darker above, being dark olive brown, and lacking the colored concealed crown patch. A young female taken just as it was leaving the nest (collected at Caicara May 10th) has the wing and tail quills and wing and tail-coverts edged and terminally margined with rufous, the feathers of the back hind neck and occiput are narrowly margined with grayish buff.

An immature female taken July 10th (also at Caicara) is in what is probably the post-juvenal or first winter plumage. This plumage is similar to the juvenal plumage, but the back is more olive and less brownish, agreeing more closely with the adult. There are no greyish buff tips to the feathers of the crown nor to those of the hind neck and they are much less prominent than those of the back. The inner secondaries are margined on the outer webs and tipped with buffy white, the remaining wing quills, wing and tail-coverts and tail quills are margined and tipped with pale rufous.

A nest which the young were just leaving was collected at Caicara May 10th. It was placed on a horizontal limb of a *Chaparo* oak about 3 m. up, and at a point where several radiating small branches supported it on all sides. It is an open cup-shaped structure. The body is composed of coarse dead twigs lined with rather coarse vegetable fibers and plant tendrils. Outside it measures 10 cm. in depth by 16 cm. in diameter. The nest cavity is about 3.5 cm. deep and 9 cm. in diameter. The structure is so loosely put together that the eggs might be seen through the nest walls.

ONYCHORHYNCHIUS¹ CORONATUS (P. L. S. Müller).

Muscicapa coronata Müll., Natursyst. Supplement, 1776. p. 168.

Muscivora coronata Berlepsch & Hartert, p. 48. (La Pricion and Nicare, Caura River, Venezuela.)

This species was not observed by the writer but it is reported by Berlepsch and Hartert in their paper as collected by André on the Caura River.

MYIOBIUS BARBATUS BARBATUS (Gmelin).

Muscicapa barbata Gm., Syst. Nat. I. 1788. p. 933.

Myiobius barbatus Berlepsch & Hartert, p. 49.

Specimens of true *barbatus* were sent from various points on the Caura River to the Tring Museum, and recorded in the Berlepsch and Hartert paper.

MYIOBIUS MODESTUS Todd.

Myiobius barbatus atricaudus (Lawr.)? [*sic.*]; Berlepsch & Hartert, p. 49.

Myiobius modestus Todd, Ann. Carnegie Mus. VIII. 1912. p. 207 (Type ♂, Upata, Venezuela, in Carnegie Museum).

Rare. Found in the thick woods. Specimens were collected at Caicara and on the River San Feliz near its junction with the Cuchivero River. Only two specimens were collected on my first expedition to the Orinoco in February, 1898; a male and female collected at almost the same spot as the Caicara specimens were taken in 1905.

In actions this bird reminds one of our American Redstart.

TERENOTRICCUS² ERYTHRURUS ERYTHRURUS (Cabanis).

Myiobius erythrurus Cab. in Wieg. für Naturg. 1844. p. 249, Pl. 5, fig. 1; Berlepsch & Hartert, p. 49. (Nericagua, Orinoco River, Nicare and Suapure, Caura River.)

A single specimen was taken in April, 1899.

EMPIDOCANES ARENACEUS (Sclater & Salvin).

Ochthoeca arenacea Scl. & Salv., P. Z. S. 1877. p. 20.

Empidochanes arenaceus Berlepsch & Hartert, p. 50.

Observed and collected at various points along the river from Las Barrancas in the delta region as far as Caicara. This species frequents the thickets in heavily timbered areas.

¹For the use of this generic name instead of *Muscivora*, see Oberholser, Auk, XVIII. 1901. p. 193.

²Ridgway, Proc. Biol. Soc. Wash. XVIII. 1905. 207.

Eye dark brown; bill black, pale at base of mandible; feet slate grey.

EMPIDONAX LAWRENCEI Allen.

Empidonax lawrencei Allen, Bull. Am. Mus. Nat. Hist. II. 1880. p. 150 (Type, *Ochthoeca flaviventris* Lawrence, "South America"—locality unknown).

Empidonax pileatus Berlepsch & Hartert p. 50 (Suapure, Caura River).

Not observed by the writer, but Klages secured a specimen on the Caura River at Suapure (see above) and the species has been also recorded from Cumana and Caripe.

MYIOCHANES BRACHYTARSUS (Sclater).

Empidonax brachytarsus Scl., Ibis, I. 1859. p. 441.

Horizopus brachytarsus depressirostris (Ridgw.) ? [*sic*]; Berlepsch & Hartert, p. 50 (Altagracia, Orinoco River, Venezuela).

A female taken at Altagracia, December 16, 1897, was sent to the Tring Museum, but the writer has not since observed the species on the Orinoco. In Trinidad it is not uncommon.

MYIARCHUS TYRANNULUS TYRANNULUS (P. L. S. Muller)

Muscicapa tyrannulus Müll., Natursyst. Supplement, 1776. p. 169 (Cayenne).

Myiarchus tyrannulus Berlepsch & Hartert, p. 51.

Common at Las Barrancas and from Ciudad Bolivar up to and beyond Caicara.

Adults have the eye seal brown; bill black; feet blackish slate. The nesting season at Bolivar begins early in April.

A male bird was flushed from a nest containing three fresh eggs April 8th. The nest was situated in a large cavity of a fence post, about 1.47 m. from the ground. The cavity was about 35.5 cm. deep, open from above, and half way down one side the eggs were easily seen at the bottom of the nest. The nesting material consisted chiefly of cow hair with one or two bits of cloth and many pieces of cast off snake skin scattered through the body of the nest and about its upper edge. A few feathers formed a nest-lining, a half-dozen bright green parrot scapulars adhering to a piece of skin being most conspicuous.

The eggs closely resemble eggs of the Crested Flycatcher of the eastern United States. They are pale creamy buff in color, marked with longitudinal lines, dashes and irregular blotches of bay brown overlying similar markings of purplish drab. They are ovate in form and measure 24.8×17 ; 23.8×16.7 and 24×17 mm.

A second nest containing three fresh eggs was found April 12th. This nest was in a hole in the centre of an old rotten stump, about 91.5 cm. from the ground, the cavity being open from above. The nesting material was in every way similar to that described above. The eggs are similar in color but with the markings more thickly spread over the surface and consisting of narrower lines, scratches and dashes of color. The measurements are 24×17.5 ; 24.7×17.9 and 24.2×17.7 mm. respectively.

A male in juvenal plumage, taken at Caicara May 6th, is very similar to the adult, differing only in that the upper parts are more brownish and less olive, and that the wing-coverts and secondaries are broadly edged and tipped with pale russet instead of brownish buff.

MYIARCHUS FEROX VENEZUELENSIS Lawrence.

Myiarchus venezuelensis Lawr., Proc. Acad. Nat. Sci. Phila., 1865. p. 38.

Myiarchus ferox venezuelensis Berlepsch & Hartert, p. 51.

Much less common than the preceding species.

Adult birds have the eye seal brown; bill black; feet blackish slate.

I have compared specimens from Ciudad Bolivar and Caicara with Lawrence's type of *venezuelensis* and find them closely similar.

MYIARCHUS TUBERCULIFER TUBERCULIFER (Lafresnaye & D'Orbigny).

Tyrannus tuberculifer Lafresnaye & D'Orbigny, Syn. Av. i, in Mag. Zool., 1837, cl. ii, p. 43 (Guarayos, East Bolivia).

Myiarchus coalei Ridgway, Proc. U. S. Nat. Mus. IX. 1886. p. 520 ("Orinoco").

Myiarchus tricolor Berlepsch & Hartert, p. 51 (Quiribana de Caicara, Nericagua, Orinoco River).

Rare; seen only in vicinity of Caicara and Quiribana de Caicara and on the upper Orinoco at Nericagua.

Eye seal brown; bill black; feet slate black.

EMPIDONOMUS VARIUS (Vieillot).

Muscicapa varia Vieill., Nouv. Dict. XXI. 1818. pp. 458, 459.

Empidonomus varius Berlepsch & Hartert, p. 51.

Not uncommon in the denser clumps of timber bordering shallow streams on the savannas and also frequenting the borders of the heavy timber growth along the Orinoco.

Immature birds differ from the adults in not having the tips of the primaries abruptly attenuated, nor have they the yellow crown patch. A male in *juvencal plumage* (taken at Caicara, May 1st) has the entire top of the head covered with rather short blackish feathers narrowly margined with ferruginous; the back is brownish black with ferruginous edges to the feathers; wings and tail brownish black, the rectrices broadly margined on both webs with ferruginous; primaries, lesser and median coverts narrowly margined with buffy rufous, greater coverts and inner primaries margined with white. That the yellow crown patch is not assumed until after the second moult is indicated by an immature female, taken at Caicara June 19th, that is just assuming the adult plumage.

The crown is pale dusky brownish sprinkled with a few black feathers with bright yellow bases. The edges of the back feathers and wing-coverts, as in the case of the immature male, are rufous. The abdomen is a pale sulphur yellow, very much brighter in color than in any of the adults before me.

The food of this Flycatcher consists largely of berries and other small fruits.

TYRANNUS DOMINICENSIS (Gmelin).

Lanius tyrannus B. *dominicensis* Gm., Syst. Nat. I. 1788. p. 302.

Tyrannus dominicensis Berlepsch & Hartert, p. 52.

Observed in the immediate vicinity of the river only and noted as not uncommon from the delta region up as far as Ciudad Bolivar. Occasionally specimens were noted as far up as the mouth of the Apure River.

This species was nesting at Agua Salada de Ciudad Bolivar, in April. The nest is similar in construction to that of *T. melancholicus*.

TYRANNUS MELANCHOLICUS SATRAPA (Calanis & Hein).

Laphytes satrapa Cab. & Hein., Mus. Hein., II. 1859. p. 77.

Tyrannus melancholicus Berlepsch & Hartert, p. 52.

Common in the thinly wooded savanna districts; resembling in its pugnacious habits our northern Kingbird.

Adults have the eye seal brown; bill black; feet blackish.

The nesting season in the neighborhood of Caicara begins at the end of March and continues into May. The nests are open structures loosely put together, rather bulky and consisting of twigs, roots and grasses without other lining material. Frequently the eggs can be seen through the nest walls. Ordinarily the nests are from 1.5 m. to 3.5 m. from the ground placed near the end of the long horizontal limbs of the scrub oak.

A set of three fresh eggs collected at Caicara May 7th was at the extreme top of a scrub oak (*Chaparo*), about 4.57 m. from the ground. A little lower down in the same tree and not 1.83 m. distant was a nest of the Blue Tanager, *Thraupis cana*. The eggs are between an ovate and a short ovate in form and measure 23.5×17.5 ; 24×17.5 ; 22.5×17.25 mm. In color they vary from whitish to very pale vinaceous buff. The markings chiefly about the larger end consist of irregular spots and blotches of dark chestnut overlying some of hazel brown and others yet deeper of lavender.

MUSCIVORA TYRANNUS (Linnaeus).

Muscicapa tyrannus L., Syst. Nat. ed. 12. I. 1766. p. 325.

Milvulus tyrannus Berlepsch, Ibis, 1884, p. 435 (Angostura); Berlepsch & Hartert, p. 52 (Ciudad Bolivar and Altagracia, Orinoco, Venezuela).

Native name *Tijireta*. The Fork-tail Flycatcher was very abundant about Ciudad Bolivar during the early part of April, equally common at Caicara during the last of April and the first half of May. At that time they were associated in large flocks, and, rising in company, their long tail-feathers fluttering gracefully, presented a most animated picture.

After the middle of May and up to the first of November this Flycatcher is much less commonly seen in the vicinity of the two places mentioned. It inhabits the sparsely wooded savanna where it seems to secure much of its insect food from among the tall grasses. In such a locality when undisturbed, single birds will be seen to flutter up from the ground, two or three feet, in pursuit of some flying insect, and again drop back into the grass.

PIPRIDAE—THE MANIKINS.

The writer has observed and collected seven species in the immediate valley of the Orinoco. Six of the seven species are included in Berlepsch and Hartert's paper, together with two additional species received by the Tring Museum from points on the Caura River.

Eleven species of manikins are included in the present list.

With one exception the species observed by me were seen only at points on the Upper Orinoco,—that is, not below the falls of Atures. The exception was an example of *Pipra aurcola* collected in the delta region at Las Barrancas.

KEY TO THE SPECIES AND SUBSPECIES OF GENERA OF PIPRIDÆ.

- a. Size large, wing more than 95 mm. *Laniocera hypopychia*
 a'. Size smaller, wing less than 95 mm.
 b. Tail short, the outstretched feet reaching to or beyond its end.
 c. Breast without dark striations.
 d. Breast white, uniform with throat on which the feathers are elongated.
 d'. Breast not white.
 e. Back blue. *Chirocephala parvula*
 e'. Back not blue.
 f. General color above and below olivaceous (for both sexes).
 g. Outermost rectrix much narrowed and shortened; and with a large bright yellow vertical crown patch.
 g'. Outermost rectrix not abnormal and crown patch absent or represented by a few concealed pale yellow spots on anterior part of crown. *Tyrannetes virescens*
 f'. General color not olivaceous. *Tyrannetes stolzmanni*.
 g. Throat, breast and belly black.
 h. Crown white. *Pipra pipra pipra*.
 h'. Crown bright orange yellow. *Pipra erythrocephala erythrocephala*
 g'. Breast crimson, shading into orange chrome on upper throat. *Pipra aureola aureola*.
 e'. Breast striated. *Machæropterus pyrocephalus*.
 b'. Tail longer; outstretched feet not reaching to end of tail.
 c. Shafts of outer tail-feathers elongated, thread-like at tip. *Cirrihipra filicauda*.
 c'. Shafts of outer tail-feathers not lengthened.
 d. Upper throat white in sharp contrast with chestnut of lower throat and breast.
 d'. Upper throat not white, not in sharp contrast with color of lower throat and breast. *Heterocercus flavivertex*.
 e. With a yellow crown patch. *Neopelma igniceps*.
 e'. No crown patch, general color above brownish olive.
 f. Head not tinged with rufous. *Scotothorus turdinus olivaceus*.
 f'. Head strongly tinged with rufous. *Scotothorus turdinus amazonum*.

CIRRIHIPRA FILICAUDA (Spix).

Pipra filicauda Spix. Av. Bras. II, 1829, p. 5. Pl. 8, figs. 1, 2.

Cirrihipra filicauda Berlepsch & Hartert, p. 52.

Not observed in going up the river until in the region of the second falls, where, about Maipures, it was abundant.

¹I follow Mr. Ridgway in placing *Laniocera* with the *Pipridæ*, notwithstanding its general resemblance to *Lathria* and *Lipaugus*, for the tarsus is certainly exaspidean.

²*Tyrannetes* Sclater and Salvin, *Ibis* 1881, p. 269.

³Reported from British Guiana—Bartica Grove, Camacusa River and Carimang.

⁴Ex. Brit. Guiana.

In life the eye is cream color; maxilla black, mandible plumbeous; feet heliotrope purple.

PIPRA ERYTHROCEPHALA ERYTHROCEPHALA (Linnaeus).

[*Parus*] *erythrocephalus* L., Syst. Nat. ed. 10. I. 1758. p. 191.

Pipra erythrocephala Berlepsch & Hartert, p. 53; Hellmayr, Ibis, 1906. p. 20.

In ascending the river this species was first met with near the mouth of the river Meta, at a point called Somborge, while from the falls of Atures, as far up as I worked, it was abundant.

It is recorded by Berlepsch and Hartert from various points on the Caura River, and Hellmayr includes Guanoco, Orinoco Delta in the habitat.

Adults in life have the eye creamy white; bill pearl white; feet pearl grey.

PIPRA PIPRA PIPRA (Linnaeus.)

[*Parus*] *pipra* L., Syst. Nat. ed. 10. I. 1758. p. 190.

Pipra leucocilla Berlepsch & Hartert, p. 53; Hellmayr, Ibis, 1906, p. 23.

Not observed by the writer on the Orinoco proper, but included in Berlepsch and Hartert's paper, the Tring Museum having received specimens from Suapure, La Pricion and Nicare on the Caura River.

PIPRA AUREOLA AUREOLA (Linnaeus).

[*Parus*] *aurcola* L., Syst. Nat. ed. 10. I. 1758. p. 191.

Pipra aurcola Hellmayr, Ibis. 1906. p. 6 (Guanoco, Orinoco Delta).

A single specimen of this species, an adult female, was collected at Las Barrancas in the delta region July 31, 1907. It was not observed at other points visited by the writer. It had been previously recorded, however, from Guanoco, also in the Orinoco Delta.

TYRANNEUTES STOLZMANNI (Hellmayr).

Pipra stolzmanni Hellm., Ibis, 1906. p. 44. (Type ex Marabitanas, Rio Negro)—Nericagua, Orinoco; Suapure, Caura Riv.

Pipra virescens (nec. Pelz.); Berlepsch & Hartert, p. 53.

Collected on the upper Orinoco, at Nericagua, by the writer. Reported also from points on the Caura by Berlepsch and Hartert.

MANACUS MANACUS INTERIOR Chapman.

Manacus manacus interior Chapman, Bull. A. M. Nat. Hist. XXXIII; 1914; p. 624-625. (Type ex Villavicencio, Colombia.)—Maripa (Caura Riv.).

Chiromachaeris manacus Berlepsch & Hartert, p. 53.

A young male taken December 24th, 1898, at Maipures, at the second falls on the river is the only record I have for this species. The American Museum contains a series from Maripa, on the Caura.

MACHAEROPTERUS PYROCEPHALUS (Sclater).

Pipra pyrocephala Scl., Rev. Zool. 1852. p. 9.

Machaeropterus pyrocephalus Berlepsch & Hartert, p. 54.

Not observed on the Orinoco. Berlepsch and Hartert report specimens from La Pricion on the Caura River.

SCOTOOTHORUS TURDINUS AMAZONUM (Sclater).

Heteropelma amazonum Sclater, P. Z. S. 1860. p. 466 (Chamicuros).

Scotothorus amazonum Berlepsch & Hartert, p. 54 (Nericagua, Munduapo, Orinoco River).

Scotothorus turdinus amazonum Hellmayr, Novit. Zool., XVII, 1910, p. 310.

Seen only in the thick forest on the upper river at Munduapo and Nericagua.

SCOTOOTHORUS TURDINUS OLIVACEUS Ridgway.

Scotothorus olivaceus Ridgway, Proc. Biol. Soc., Wash., XIX. 1906. p. 118 (Type, Rio Mato, near its mouth, on the Caura River, Venezuela, in collection Am. Mus.).

Scotothorus wallacei Berlepsch & Hartert, p. 54 (Nicare and La Pricion, Caura River, Venezuela).

Scotothorus amazonum wallacii Hellmayr, Novit. Zool., XIII. 1906. pp. 363-4 (Caura River, Venezuela).

S[cotothorus] t[urdinus] olivaceus Hellmayr, Novit. Zool., XVII, 1910, p. 31.

Not noted on the Orinoco proper, but reported by Berlepsch and Hartert from the Caura River.

HETEROCERCUS FLAVIVERTEX Pelzelin.

Heterocercus flavivertex Pelz, Orn. Bras., 1870. pp. 125, 186; Berlepsch & Hartert, p. 54.

H[eterocercus] angosturæ Berlepsch & Leverkühn *Ornis*. VI.: 1890: 19 (Orinoco).

Common about Perico and at Maipures, not noted elsewhere.

LANIOCERA HYPOPYRRHA (Vieillot).

Ampelis hypopyrrha Vieillot, *Nouv. Dict.* VIII. 1817. p. 164.

Laniocera hypopyrrha Berlepsch & Hartert, p. 57.

This species was noted only once, a male having been taken at Nericagua April 5, 1899. Berlepsch and Hartert also record specimens from Suapure, La Pricion and La Union on the Caura River.

COTINGIDÆ—COTINGAS, TITYRAS, ATILAS, BECARDS, ETC.

Fourteen species are included in the present paper. Only eleven of that number however were observed or collected by the writer on the Orinoco proper, the other three species were included in the Berlepsch and Hartert paper and came from points on the Caura River, but as pointed out in my remarks under Tyrannidæ, there are a number of species included under that heading having structural characters that indicate their nearer relationship to the Cotingidæ.

KEY TO THE SPECIES AND SUBSPECIES OF GENERA OF COTINGIDÆ.

- a. Tarsus pyraspidean¹ or, essentially, taxaspidean.²
- b. The plantar space on posterior side of tarsus broken up into numerous small irregular scutella.
- c. Rectal bristles strongly developed.
 - d. Upper part of tarsus feathered in front..... *Lathria cinerea*.
 - d'. Upper part of tarsus naked..... *Pyroderus orenocensis*.
- c'. Rectal bristles weak or obsolete.
 - d. Wing not more than 125 mm.
 - d'. Wing more than 125 mm.
 - f. A naked space about the eye and along the sides of the neck. *Gymnoderus foetidus*.
 - f'. Loral region and sides of neck feathered.
 - g. With a conspicuous crest on pileum..... *Cephalopterus ornatus*.
 - g'. Pileum not crested..... *Querula purpurata*.
- b'. The plantar space on each side of posterior half of tarsus with a continuous row of rather large scutella.
- c. Tail about as long as wing, and all the primary quills normal in both sexes..... *Neomarsiphanella*.
- c'. Tail much shorter than the wing, and the next to the outermost primary in adult male much shortened and with an acuminate tip.
 - d. Width of bill at base not greater than the depth at the same point. *Platypsaris minor*.
 - d'. Width of bill at base much greater than the depth at base.
 - e. Wing more than 95 mm.
 - e'. Wing less than 95 mm..... *Erator inquisitor erythrogenys*.
 - f. Rectrices rather broadly tipped with white, buffy or rufous.
 - g. Above dark grey, middle of back varied with black (male). *Pachyrhamphus atricapillus*.
 - g'. Above black or dull or greyish olive.
 - h. Rectrices white tipped (males)..... *Pachyrhamphus polychropterus nigro*.
- b'. Rectrices tipped with buff or rufous (females).

¹"The broad plantar space on posterior side of tarsus broken up into numerous small irregular or roundish scutella or granules." Ridgway, *Bull.* 50 U. S. N. M. pt. IV. 1907. 328.

²"The broad plantar space occupied by two or, rarely three, series of smaller, quadrate, rectangular, or hexagonal scutella" Ridgway (*l. c.*)

- i.* Above dull olive with head more or less rufescent. *Pachyrhamphus marginatus.*
i'. Head uniform with back (not rufescent) *Pachyrhamphus polychropterus niger.*
f'. Rectrices not broadly tipped with white, buff or rufous.
g. Pileum black, blackish or grey, sharply contrasting with general color of the upper parts.
h. Above grey, with or without slight olive wash (male) *Pachyrhamphus cinereus.*
h'. Above tawny olive. *Pachyrhamphus marcidus.*
g'. Pileum cinnamon rufous nearly uniform with back (female) *Pachyrhamphus cinereus.*
a'. Tarsus neither pycnospidean nor essentially taxaspidean.
b. Upper posterior portion of tarsus (near heel joint) conspicuously serrate, and basal phalanx only of middle toe adherent, for most of its length, to the outer toe. *Lipaugus immundus.*
b'. Upper posterior portion of tarsus not conspicuously serrate, and the middle and outer toes adherent for more than the length of the basal phalanx of the middle toe. *Attila wighti.*¹

TITYRA CAYANA (Linnaeus).

Lanius cayannus L., Syst. Nat. ed. 12. l. 1706. p. 137.

Tityra cayana Berlepsch & Hartert, p. 55.

Not common. In ascending the Orinoco this species was noted at various points from Caicara to above the second falls at Maipures, on the upper river. A female collected at Caicara July 3, 1907, was evidently nesting as the ovaries were active.

ERATOR INQUISITOR ERYTHROGENYS (Selby).

Psaris erythrogenys Selby, Zool. Journ., II. 1826. p. 483.

Tityra inquisitor erythrogenys Hellmayr, Novit. Zool. XIII. 1906. pp. 327-8 (Rio Catañapo, Perico, Maipures, Orinoco River, Venezuela).

Tityra erythrogenys Berlepsch & Hartert, p. 55 (Perico, Rio Catañapo, Maipures, Orinoco River).

On my first expedition this species was not observed below the Falls of Atures, but on the last two expeditions it was not uncommon about Caicara.

Eye seal brown; bill, maxilla black with slate grey basal cutting edges, mandible slate grey; feet dusky slate.

PLATYPSARIS MINOR (Lesson).

Querula minor Less., Tr. d'Orn. I. 1831. p. 363.

Hadrostomus minor Berlepsch & Hartert, p. 50 (Suapure, Caura River, Venezuela).

This species was included in the Berlepsch and Hartert paper, the Tring Museum having received a specimen from the Caura River. It was not seen by me on the Orinoco proper.

The American Museum collection contains specimens from the Caura, received from Klages.

¹As far as I know this species (the type of which came from Trinidad) has not been taken at any point along the Orinoco, but future collecting will probably discover it there.

PACHYRHAMPHUS CINEREUS (Boddaert).

Pipra cinerea Bodd., Tab. Pl. Enl. 1783. p. 43.

Pachyrhamphus cinereus Berlepsch & Hartert, p. 56.

Eye dark seal brown; bill plumbeous, in the male with the tip of the maxilla black, in the female, tip of maxilla and ridge of culmen black; feet plumbeous.

PACHYRHAMPHUS MARCIDUS Cherrie.

Pachyrhamphus marcidus Cherrie, Sci. Bull. Bklyn. Inst. Mus. I. 1909. p. 389 (Type ♀, Las Barrancas, delta region, Orinoco River, Venezuela).

Only two specimens secured, both from the same locality, one day apart.

PACHYRHAMPHUS POLYCHROPTERUS NIGER (Spix).

Pachyrhynchus niger Spix, Av. Bras. II. 1825. 1829. p. 33, Pl. 45, fig. 1.

Pachyrhamphus niger Berlepsch & Hartert, p. 56 (Ciudad Bolivar, Altagracia, Caicara, Perico and Maipures River, Orinoco; Suapure and La Pricion, Caura River, Venezuela).

Not uncommon in the low thick underbrush bordering heavy timber on one hand and open savanna on the other. Found all along the river from the delta region at Las Barrancas at least as far as San Fernando de Atabopo above the falls.

The food consists apparently of about equal parts of insects and small fruits.

In the male the eye is seal brown; bill plumbeous black at tip; feet slate grey; female, eye seal brown; bill above black, mandible whitish at base, slate grey at the tip; feet slate grey.

Considerable individual variation exists in the amount of greyish mottling on the under surface, two out of four adult males having narrow ill-defined greyish shaft streaks on the chin and throat. A specimen from Trinidad has the general under surface lighter grey, but with less distinct mottling. A specimen from Cayenne is nearly uniform sooty black with very faintly indicated greyish mottling on the belly. The amount of grey on the rump is also extremely variable, in some examples scarce a trace being visible, the rump being nearly uniform black like the back.

PACHYRHAMPHUS MARGINATUS (Lichtenstein).

Todus marginatus Lichtenstein, Verz. Doubl. Berliner Mus., p. 51 (1823—Bahia).

Pachyrhamphus atricapillus Berlepsch & Hartert, p. 56 (Munduapo, Orinoco River, Suapure and La Pricion, Caura River, Venezuela). A single specimen taken at Munduapo February 27, 1899.

Eye seal brown; bill plumbeous with the tip (only) of maxilla black; feet plumbeous.

XENOPSARIS ALBINUCHA (Burmeister).

Pachyrhamphus albinucha Burm., P. Z. S. 1868, p. 635 (Rio de La Plata, near Buenos Ayres).

Xenopsaris albinucha Ridgway, Proc. U. S. Nat. Mus. XIV. 1891, p. 479; Berlepsch & Hartert, p. 36.

Not uncommon along the middle Orinoco from Ciudad Bolivar up as far, at least, as Caicara.

Dr. Burmeister following his original description of this species (*l. c.*) states that it "lives in the sedges of the shores of the Rio de La Plata." Along the Orinoco I found it to be an inhabitant of the sparsely wooded savanna regions. In habits it is much like *Pachyrhamphus*, certain species of which it also closely, if superficially, resembles; and one having observed members of that genus, and the present species, in the field, could not wonder at its having been associated with *Pachyrhamphus* by its describer. Also, Mr. Ridgway (*l. c.*) was certainly correct in describing the genus *Xenopsaris* as pertaining to the family *Cotingidae*.

Berlepsch and Hartert following Dr. Cabanis and Dr. Sclater associate *X. albinucha* with the *Tyrannidae* "in the neighborhood of *Cnipolegus*," but as pointed out by Ridgway¹ the tarsus is *not* exaspidæan. It may be of interest to record my observations on the characters of the tarsal covering as seen in fresh specimens of *Xenopsaris* and of *Cnipolegus*. In *Xenopsaris* the acrotarsium covers the anterior half only. The outer posterior half is covered by a series of scutella that merge, at the upper end, into the papillae covering the heel, and at the lower end into the papillae covered area just above the hallux. On the back of the tarsus are three rows of small irregularly quadrate scutella, those making up the row on the inner side being smallest (papillae like);

¹Birds of North and Middle America IV, 1897, pp. 776-7.

and between the inner row and the edge of the acrotarsium there is a narrow strip of non-scutellate membrane.

The outer toe is longer than the inner one, without claw it reaches to the middle of the subterminal phalanx of the middle toe; inner toe, without claw, reaches to just beyond the base of the subterminal phalanx of the middle toe. Entire basal phalanx of middle toe united to outer toe, and about one-fourth its length to the inner toe.

In *Knipolegus* the acrotarsium extends entirely across the outside and around on to the back of the tarsus, except at the upper end where the posterior outer half is occupied by three irregularly quadrate scutella. On the inside the acrotarsium extends about half way across at the upper end and almost completely across at the lower end. (In dried skins the two edges of the acrotarsium usually meet!) The heel is covered with roundish papillae, but the remaining integument between the edges of the acrotarsium is non-scutellate.

The outer and middle toes are united at the base for the length of the basal phalanx of the outer toe. The inner and middle toes are cleft almost to the base.

LATHRIA CINEREA (Vieillot).

Ampelis cinerea Vieill., Nouv. Dict. VIII. 1817. p. 162.

Lathria cinerea Berlepsch & Hartert, p. 57.

Native name *Pajaro minero*. Not observed until above the second falls at Munduapo and Nericagua, where it was abundant, inhabiting the dense forest where it frequents the lower branches of the larger trees.

I shall always remember with pleasure what a thrill of expectancy shot through me when I first heard the clear ringing call of this bird. I was in the dark thick *gomales* forest (rubber trees) following an Indian trail when I was startled by a loud metallic whistle that seemed to come from directly over my head, high up in the tree tops; in a moment I heard it off to my right, then to my left; first on this side, then on that. Then other clarion calls came from the dense forest all about me, some near, others only faintly heard in the distance. The almost death-like stillness that seemed to pervade the twilight quietude of the forest had suddenly been broken and the air reverberated with high-pitched, long-drawn whistling calls. It was a new call to me, one that sent the blood coursing with expectancy. I stepped cautiously forward peering intently into the thick canopy of leaves far above me. The calls were most tantalizing and my

neck ached with the strain of gazing upward when my eye caught a glimpse of a good-sized, dark-colored bird alighting on a bare branch only about 3 meters from the ground and about 9 meters from where I stood. For an instant I forgot the enticing whistles and gave my attention to this quiet dweller of the forest. As I looked the body stiffened and its owner sat up sharply erect, the bill opened and the mystery of those notes that had so thrilled me and brought every sense into unison was solved. This modestly dressed piper was the master ventriloquist.

LIPAUGUS IMMUNDUS Sclater & Salvin.

Lipaugus immundus Scl. & Salvi., Nomencl. Av. Neotr., 1773, pp. 57, 150.

Lipaugus simplex immundus Berlepsch & Hartert, p. 57 (Nericagua and Perico, Orinoco River, Suapure and La Pricion, Caura River).

Rare. This species, on my first expedition, was observed and collected at Perico and Nericagua only. Berlepsch and Hartert record Tring Museum examples from La Pricion and Suapure on the Caura River, and in 1907 the writer observed and collected specimens at La Cascabel on the San Feliz River near its junction with the Cuchivero River.

Eye bay brown; bill black; feet slate color.

A male collected at La Cascabel, May 26, 1907, has a distinct narrow greyish collar extending completely around the neck.

ATTILA UROPYGIALIS (Cabanis).

Dasycephala uropygialis Cab. in Schomb. Reise Brit. Guiana, III, 1848, p. 686.

Attila uropygialis Berlepsch & Hartert, p. 58.

This species was not observed on the Orinoco proper, but specimens were sent to the Tring Museum from Suapure and La Pricion on the Caura River.

QUERULA PURPURATA (P. L. S. Müller).

Muscicapa purpurata Müll., Natursyst. Supplement, 1776, p. 109.

Querula purpurata Berlepsch & Hartert, p. 58.

Not seen by the writer but collected by both André and Klages on the Caura River and recorded in the Berlepsch and Hartert paper.

PYRODERUS SCUTATUS ORENOCENSIS (Lafresnaye).

Coracina orenocensis Lafresnaye, Rev. Zool. 1846, p. 277 ("Orenoque").

Pyroderus [scutatus orenocensis] Chapman, Bull. Am. Mus. Nat. Hist. XXXIII: 1914: p. 631 (Altagracia, Orinoco Riv.).

The recording by Chapman of a specimen collected by M. A. Carriker at Altagracia on the Orinoco confirms Lafresnaye's type locality "Orenoque."

CEPHALOPTERUS ORNATUS Geoffroy.

Cephalopterus ornatus Geoffr., Ann. d. Mus. Paris XIII. 1809. p. 238, Pl. 17; Berlepsch & Hartert, p. 58.

After passing the mouth of the river Meta, on my way up the Orinoco, this species was occasionally observed, and specimens were collected at Samborge and Nericagua. They are both difficult to see, and difficult to get, from their habit of keeping to the very tops of the high forest trees.

Adults have the eye pearl grey; bill black above, plumbeous below; feet slate grey.

GYMNODERUS FOETIDUS (Linnaeus).

Gracula foetida L., Syst. Nat. ed. 12. I. 1766. p. 164.

Gymnoderus foetidus Berlepsch & Hartert, p. 58.

Native name *Pavita*. This, like the preceding species, is rarely seen as it keeps to the thick foliage of the tree tops. It was not met with below the mouth of the Meta.

RUPICOLIDAE—THE COCK OF THE ROCK.

RUPICOLA RUPICOLA (Linnaeus).

Pipra rupicola L., Syst. Nat. ed. 12. I. 1766. p. 338.

Rupicola rupicola Berlepsch & Hartert, p. 58.

Although no specimens were collected this species was frequently observed about the Maipures rapids on the Orinoco.

FURNARIIDAE—THE OVENBIRDS.

Accepting Mr. Ridgway's characterization of the family of the oven-birds¹. I find it represented in the Orinoco region by seven genera in which are included fourteen species and subspecies.

Members of this family are remarkable for the very unusual character and variety of their nests.

¹Birds of North and Middle America V. 1911. p. 170.

I believe all the species found in our region are permanent residents there. Several of the forest frequenting species such as those that pertain to the genera *Philydor*, *Xenops*, and *Automolus* are commonly found in the small flocks of birds (made up of many unrelated forms) that wander aimlessly about the forests and that are so characteristic of bird life in the tropics.

KEY TO THE GENERA, SPECIES AND SUBSPECIES OF FURNARIIDAE.

- a. Maxilla with tip not at all decurved; mandible strongly recurved terminally. *Xenops concolor*.
- a'. Maxilla with tip more or less decurved and mandible not recurved terminally.
- b. Nostrils decidedly operculate, opening a narrow longitudinal slit.
- c. Breast streaked, the feathers with buffy shaft streaks.
- d. Tail short, slightly rounded; outstretched feet reaching to end of tail. *Microxenops milleri*.
- d'. Tail long, graduated; outstretched feet falling far short of end of tail. *Thriphopha cherriei*.
- c'. Breast feathers without buffy shaft streaks.
- d. A distinct, yellow, yellowish, black or blackish chin spot.
- e. Breast hazel brown, chin and upper throat blackish.
- e'. Breast not hazel.
- f. Crown chestnut brown, in sharp contrast with remaining upper parts. *Siptornis hyposticta*.
- f'. Crown practically uniform in color with back.
- g. Primary quills with distal half (more or less) of inner webs blackish, the line between that and the rufous basal portion being abruptly transverse. *Synallaxis cinnamomea*.
- g'. The blackish color of the distal part of the inner webs of the primaries extends well toward the base of the quills along the shaft; the line between the blackish tips and rufous base extending diagonally across the web of the feathers. *Synallaxis gujanensis*.
- d'. Chin spot (if present) neither yellowish nor blackish.
- e. General color of upper parts bright hazel brown (pileum darker). *Synallaxis vulpina alopecias*.
- e'. General color of upper parts buffy-brown, or olive-brown with rufous wash.
- f. Tail brown, nearly uniform with back. *Synallaxis albescent albigularis*.
- f'. Tail nearly walnut brown, not uniform with back. *Synallaxis gujanensis gujanensis*.
- b'. Nostrils not operculate (opening not slitlike), rounded, opening
- c. General color of under parts bright raw sienna. *Philydor pyrrhodes*.
- c'. General color of under parts buffy-brown, olive buff, or dusky tawny.
- d. Feathers of crown (slightly elongated) and occiput chestnut, very distinct from the rusty raw-umber of the back. *Philydor rufipileus concolor*.
- d'. Feathers of crown and occiput nearly concolor with back, not chestnut.
- e. A well defined buffy-yellow superciliary stripe extending from the bill to the occiput; throat reed yellow. *Philydor ruficaudatus*.
- e'. No superciliary stripe, or, if present, not well developed, and throat not reed yellow.
- f. General color of under-parts tawny olive brown, paler in the centre; chin and upper throat pinkish buff. *Automolus turdinus*.
- f'. General color of under-parts without tawny shade; chin, throat and middle of breast cartridge buff (Ridgway's); sides, back and crown brown.

SYNALLAXIS ALBESCENS ALBIGULARIS Sclater.

Synallaxis albigularis Scl., P. Z. S. 1858. p. 63.

Synallaxis albescent albigularis Berlepsch & Hartert, p. 59.

Noted from the delta region at Las Barrancas up as far as the mouth of the Apure River.

An immature bird collected at Las Barrancas, August 1, 1907, is nearly uniform bistre brown above, the wings and tail dusky brownish edged with the color of the back; below, the throat and belly are pale buff washed with ochraceous. Sides of upper breast brownish olive almost meeting across the breast; under tail-coverts, sides and flanks buffy olive; under wing-coverts ochraceous buff. In life the eye was sepia brown; bill above black, below dusky grey; feet dusky pea green.

The White-throated Spine-tails frequent the almost impenetrable thickets of thorny bushes, vines and stunted trees that spring up in areas which have been cleared for cultivation and later abandoned, and also in localities where the soil seems so poor as to be unable to support anything besides thorny bushes.

In habits they remind one somewhat of the wrens. Their flight is weak and when disturbed they only fly a few feet at a time, from one thicket to another, rarely if ever mounting into the tree tops.

The breeding season is evidently a long one, as at Caicara I have found nests with fresh eggs the first of May and again in the middle of August. The nests are extraordinary structures from 40 to 50 cm. in length, composed of dry, usually thorny twigs, from 5 to 15 cm. in length, skillfully woven into an upright cylindrical shaped mass with a long tubular entrance to the nest cavity, which occupies the lower half of the cylinder. They are sometimes built within from 3.5 to 15 cm. of the ground among the thorns of low bushes, the foliage of which completely hides the nest. Again, I have found them 1.22 m. from the ground, above the tops of the surrounding bushes, not in any way concealed, the body of the nest resting in the forks of a low tree and the entrance tube supported along the top of one of the limbs. The twigs at the top of the body of the nest are laid longitudinally so as to form a sort of thatched roof over all. The eggs are a uniform pale greenish in color; and three constitute a full set.

A nest, and three fresh eggs taken at Caicara May 9th, was built only about 15 cm. above the ground in a low dwarfed tree, whose branches bristled with short, thin and exceedingly sharp thorns. It was completely concealed from above and on the sides by foliage. The nest is constructed entirely of small, dry, and for the most part thorny sticks, from 5 to 12 cm. in length. But, in spite of the thorns, and the consequent irregular shape of the twigs employed, they are laid together and interwoven with such skill that only very small

interstices are to be observed, and considerable force was required to make an opening through the nest walls in order to remove the eggs. This nest, bristling with thorns, and built of strongly interwoven twigs, together with its peculiar shape, would seem to offer an ideal concealment and safe retreat for the eggs and the parent bird during incubation and later for the helpless young. The eggs are a pale greenish in color, ovate in form and measure 19.8×12.2 ; 20.2×15.5 and 20.5×15.5 mm.

A second nest taken on the same date was similar in general shape and in the materials employed in construction, but was some 40 cm. from the ground in the forks of a low tree. It was not, however, in any degree concealed by foliage; and the entrance tube was almost at right angles to the body of the nest, its position doubtless being determined by the supporting limb, while the entrance tube in the example described above entered at an angle of about 45° to the body of the nest. This nest contained three eggs with incubation well advanced. The eggs are uniform in color with the ones above described but are more of a short ovate in form. They measure 19×15.2 ; 19.3×15.5 and 18×15.5 mm.

SYNALLAXIS CINNAMOMEA (Gmelin).

Certhia cinnamomea Gm., Syst. Nat. I. 1788. p. 480.

Synallaxis cinnamomea Berlepsch & Hartert, p. 59.

Found abundantly at Ciudad Bolivar and at various points on the San Feliz River near its junction with the Cuchivero River (and in 1897 very common at Altagracia, half way between Bolivar and Caicara), but rarely met with at Caicara. It inhabits the thickets and low bushes bordering streams and ponds.

Eye in different examples, varying from a hazel brown to a pale hair brown; bill, plumbeous above, pale below; feet, from a slate to a plumbeous grey.

A nest containing two fresh eggs, together with the parent bird, was collected at Las Guacas on the San Feliz River May 31, 1907. The nest, similar in structure and similarly located to nests of *S. a. albigularis*, was about 60 cm. from the ground in the centre of a thorny bush. The eggs, a pale greenish or bluish green in color, are ovate in form and measure 19.25×14.35 mm. and 19.25×14.5 mm. respectively.

Beebe obtained specimens at Guanoco in the delta region.

SYNALLAXIS GUJANENSIS GUJANENSIS (Gmelin).

Motacilla gujanensis Gm., Syst. Nat. I. 1788. p. 988.

Synallaxis guianensis Berlepsch & Hartert, p. 59.

This species was not observed on my earlier expeditions, but in July, 1907, two adult males were collected at Las Barrancas in the delta region.

In the American Museum there is an adult female collected by Klages at La Union on the Caura River, Sept. 26, 1901.

Eye dusky brown; bill above black, below slate grey; feet grey.

The Tring Museum received specimens from La Pricion on the Caura River.

SYNALLAXIS RUTILANS Temminck.

Synallaxis rutilans Temm., Pl. Col. 1823. p. 227; Berlepsch & Hartert, p. 60.

Seen only on the upper river above the falls of Maipures, at Nericagua. Klages and André both collected specimens on the Caura River (Suapure, La Pricion, Nicare and La Union) that were sent to the Tring Museum. There are two females in the American Museum collected by Klages at Suapure on the Caura River, one in September, the other in February.

SIPTORNIS VULPINA ALOPECIAS (Pelzeln).

Synallaxis alopecias Pelz., Sitz. Akad. Wien, XXXIV. 1859. p. 101.

Synallaxis vulpina alopecias Berlepsch & Hartert, p. 59.

Common at Ciudad Bolivar and at all points visited along the Orinoco up to and beyond the falls of Maipures. It frequents the thickets bordering streams and ponds.

Adults have the eye vandyke brown; bill dark brown above, lilac grey below; feet sage green.

A nest and two fresh eggs were collected at Caicara July 2, 1907. One egg of the set was accidentally crushed, the remaining egg is pure, dull white, ovate in form and measures 20 x 15.5 mm. Three weeks prior to the collecting of the eggs and nest a pair of Fox-red Spine-tails were observed hovering about what appeared to be a mass of drift grass that had lodged between the forks at the top of a slender

sapling, and that at that time was some 2.13 m. above the surface of the water. (The sapling stood in a flooded area and at that level of the water was perhaps one hundred meters from the river shore.) Masses, similar to that at which the Spine-tails were working, are common all along the river and represent in many cases veritable accumulations of drift but quite as often they are doubtless the old nests of such species as *Pitangus sulphuratus rufipennis*, *Myiozetetes cayanensis rufipennis* or *M. texensis columbianus* that have been submerged during the flood season, and impregnated with the fine sediment from the surrounding water. After the waters recede, the mud filled masses of drift become tenanted with many forms of insect life and soon develop into a favorite hunting ground for various species of insect feeding birds that gradually tear them to pieces, often piercing them with tunnels in their search for insect prey. It was such a torn and ragged bit of drift that the Spine-tails laid claim to it as their own special property. The interior was hollowed out and enlarged, and finally one of the entrances that had formed a part of a tunnel through the nest was closed, some dry soft leaves and wood-fiber were taken in as a foundation for an inner nest lining of grey lichens—the nest was completed but outwardly still looked a mere bunch of drift.

While the form of this nest, the materials employed in its general structure and the site chosen all differ widely from the nests of other species of spine-tails that I had opportunity to examine (such as that described under *Synallaxis albescens albigularis*) there remains, in the use of grey lichens as the inner lining of the nest, a characteristic common to all. Is this use of grey lichens in lining the nest cavity an hereditary custom descended from a distant common ancestor?

Two eggs of the Venezuelan Cowbird (*Molothrus bonariensis venezuelensis*) were found in the nest with those of the Spine-tails.

SIPTORNIS HYPOSTICTA (Pelzeln).

Synallaxis hyposticta Pelz., Sitz. Akad. Wien, 1859. p. 102.

Siptornis hyposticta Berlepsch & Hartert, p. 60.

Noted only on the upper river at Munduapo and Nericagua. Specimens were also taken at La Pricion on the Caura River by Klages.

In the American Museum collection there is a single specimen from La Union on the Caura River, an adult male, collected October 23rd.

THRIPOPHAGA CHERRIEI¹ Berlepsch & Hartert.

Thripophaga cherriei Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 60 (Capuano, Orinoco River).

The male and female specimens on which this species is based were collected Feb. 5, 1899, at a small Piaroa Indian settlement called Capuano on the opposite side of the Orinoco and about twenty-five miles above the mouth of the river Vichado. The species had not been observed on subsequent expeditions.

H. von Berlepsch further says:—

"This new species, which we have great pleasure to name after its discoverer, Mr. G. K. Cherrie, seems to be quite distinct from any species described hitherto. In its uniform upper surface it resembles somewhat *Th. fusciceps* Scl. from Bolivia; but it is a much smaller bird, and has a dark orange-rufous mark on the upper part of the throat wanting in that species.

"The upper parts of the body in the new species are of a dark olivaceous brown with a rufescent tinge, which is not observable on the pileum, this being of a paler olivaceous brown. The under parts of the body are of a much clearer olivaceous brown with a fulvescent tinge. The lower throat, the upper breast and the sides of the head show a narrow and sharp creamy buff stripe in the middle of each feather, which is widening a little to the tip of the feather. The large mark on the upper throat is of a dark orange rufous color. The upper surface of the wings is of a dark but vivid rufous brown. The tail, with the upper tail-coverts, is of a bright chestnut. The under wing-coverts are cinnamon, and the inner margins of the remiges are fulvous brown. The upper mandible and the legs are dusky brown, the under mandible is yellowish.

"Capuano: ♂ adult in much worn plumage, ♀ 5. ii., '99.

"Iris wood-brown; feet sage-green; bill above dusky smoke-grey, below pale grey."

¹As I believe, the type (an adult female), and a male taken at the same time, are still the only specimens in existence in museums, I reproduce herewith the original description:—

"*Thripophaga cherriei*, sp. nov. (Pl. XII, f. 2).

"*Thr.* corpore supra obscure rufescente olivaceo-brunneo, absque striis vel maculis, pileo pallidiore magis olivaceo, corpore subtus cum capitis lateribus clariore fulvescente olivaceo brunneo, collo inferiore, pectore capitisque lateribus striis angustis definitis fulvescenti-albis instructis, macula magna in gula superiore intense aurantio-rufa, alis extus obscure castaneo-brunneis, cauda tectricibusque supracaudalibus obscure castaneis, tectricibus subalaribus cinnamomeis remigibus intus fulvo-brunneo marginatis; maxilla pedibusque corneis, mandibula flavescente.

♂ al. 67, caud. 68, culm. 14½, tars. 19 mm.
" 66, " 65, " 14½, " 18½ mm.

"Habitat: circum Capuano, Rio Orinoco.

"Typus: in Mus. H. von Berlepsch (5. ii. 1899)."

"(Nos. 11834, 11835, Cherrie coll.).

"The *female* is like the *male*, save that the back is slightly more rufous, and the longitudinal marks on the chest are more fulvescent. It is also a little smaller."

AUTOMOLUS TURDINUS (Pelzeln).

Anabates turdinus Pelz., Sitz. Wien, 1859. p. 110 (Brazil).

Automolus turdinus Berlepsch & Hartert, p. 61.

Seen only at Munduapo. Two males taken in February.

AUTOMOLUS INFUSCATUS CERVICALIS (Sclater).

Philydor cervicalis Sclater, P. Z. S., 1889. p. 33. (Bartica Grove, Camacusa, British Guiana).

Automolus sclateri Berlepsch & Hartert, p. 61 (Nericagua, Orinoco River, La Pricion, La Union and Nicare, Caura River, Venez.).

Automolus infuscatus cervicalis Scl.; Hellmayr, Novit. Zool. XIII. 1906. p. 335. Caura River and Orinoco River, Venezuela; British Guiana.

Observed only on the upper Orinoco. Male and female (adults) taken at Nericagua during March. Berlepsch and Hartert record specimens from La Pricion, La Union and Nicare on the Caura River.

Three specimens, two males and a female, collected by Klages at La Union on the Caura River, are in the American Museum. These specimens have the crown of the head slightly rufescent in contrast with the olive brown back which serves at a glance to distinguish them from a specimen from the upper Amazon—a true *A. infuscatus*.

PHILYDOR PYRRHOIDES (Cabanis).

Anabates pyrrhodes Cab. in Schomb., Reise Brit. Guiana, III. 1848. p. 689.

Philydor pyrrhodes Berlepsch & Hartert, p. 62.

Not uncommon on the upper river at Munduapo and Nericagua. Not observed elsewhere.

PHILYDOR RUFICAUDATUS (d'Orb & Lafr).

Anabates ruficaudatus Lafresnaye et d'Orbigny Syn. Av. II: 1838: p. 15 (Bolivia).

In the American Museum collection there is a specimen from the foot of Mt. Duida, collected by Miller & Iglseider.

PHILYDOR RUFIPILEATUS CONSOBRINUS Sclater.

Philydor consobrinus Sl. P. Z. S. 1870. p. 323 (Bogota).

Philydor consobrinus rufipileatus Berlepsch & Hartert, Novit. Zool. IX 1902. p. 61.

Philydor rufipileatus consobrinus Hellmayr Verh. Zool.—bot. Ges. Wien. LIII. 1903. p. 220 (River Caura, Venez.).

Recorded from the Caura River by Berlepsch and Hartert and by Hellmayr. Not observed on the Orinoco proper.

XENOPS GENIBARBIS Illiger.

Xenops genibarbis Ill., Prodr. Orn. 1811. p. 213; Berlepsch & Hartert, p. 62.

Not noted until after passing above the falls of Atures; common from that point onward. Specimens were collected at Munduapo, Nericagua and Maipures.

Berlepsch and Hartert record specimens from La Union, Nicare and Suapure on the Caura River.

MICROXENOPS MILLERI (Chapman).

Microxenops milleri Chapman, Bull. Am. Mus. Nat. Hist. XXXIII: 1914: 196 (Foot of Mt. Duida, Upper Orinoco, Venez.).
Type in collection of American Museum.

DENDROCOLAPTIDAE—THE WOODHEWERS.

Twenty-six species and subspecies were included in the Berlepsch and Hartert paper, twenty-three of which number were collected by the writer on the Orinoco proper and three received by the Tring Museum from points on the Caura River.

As was to be expected, as with the Furnariidae, the greatest number of species and of individuals was found in the heavily forested regions above the cataracts of Atures and Maipures.

KEY TO THE GENERA, SPECIES AND SUBSPECIES OF DENDROCOLOPTIDAE.

- a. Nostrils narrow and elongated with a distinct operculum.
- b. Tips of rectrices strongly decurved.
- c. Bill wedge-shaped, tip of maxilla flattened (horizontally).
- d. Throat pale ochraceous-orange; brown of back less intense approaching Dresden-brown *Glyphorhynchus cuneatus cuneatus*
- d'. Throat dark ochraceous-orange; brown of back more intense approaching Brussels-brown *Glyphorhynchus cuneatus castelnaudi*.
- e'. Bill slender, not wedge-shaped, tip of maxilla pointed *Sittasomus amazonicus*

- b'*. Tips of rectrices very slightly or not at all decurved.
- c*. Lores and chin buffy gray, general color of under parts a dark Isabella color (Ridgway's Color Standards), wing usually more than 100 mm. *Dendrocincla cineracea phaeocephala*.
- c'*. Lores dusky gray, chin whitish, general color of under parts brownish olive, wing usually less than 100 mm. *Dendrocincla merula*.
- e'*. Nostrils rounded, operculum indistinct or absent.
- f*. Bill very long and slender and much curved.
- b'*. Bill not unusually long, slender or much curved.
- c*. Back *not* marked with pale or buffy shaft lines or stripes (at least not indicated on more than anterior part of mantle and then in combination with a whitish bill).
- d*. Top of head *not* marked with shaft lines or spots *Xiphocolaptes major*.
- d'*. Top of head distinctly marked with shaft lines or spots.
- e*. Feathers of back marked with indistinct transverse dusky bars.
- e'*. Feathers of back without any indication of transverse bars.
- f*. Large, total length *more* than 25 cm.; wing *more* than 120 mm. *Nasica longirostris*.
- f'*. Smaller, total length *less* than 25 cm.; wing *less* than 120 mm.
- g*. Crown marked with narrow, pale, buffy shaft streaks *Dendroplex picus picus*.
- g'*. Crown marked with broadly guttate buffy shaft spots *Dendroplex picirostris*.
- c'*. Back distinctly marked with buffy shaft lines or stripes, bill blackish.
- d*. Under parts, including under tail-coverts, with distinct, well defined, *pale*, buffy streaks.
- d'*. Streaks on under parts, *if* extending to crissum and under tail-coverts, *then* not distinct or well defined.
- e*. Feathers of chin and upper throat narrowly edged with dusky or blackish.
- f*. Distance from nostrils to tip of bill greater than length of *maxilla*.
- g*. Chin and upper throat whitish or pale buffy, cutting edge of maxilla distinctly decurved at the tip *Xiphorhynchus jardinei*.
- g'*. Chin and upper throat ochraceous buff, cutting edge of maxilla nearly straight *Xiphorhynchus pardalotus*.
- f'*. Distance from nostrils to tip of bill *not* greater than length of tarsus. *Xiphorhynchus obsoletus novae-hollandiae*.
- e'*. Feathers of chin and upper throat *not* edged with dusky or blackish.
- f*. Under tail coverts strongly washed with rufous *Xiphorhynchus guttatus guttatus*.
- f'*. Under tail coverts uniform with abdomen, faintly, or not at all washed with rufous *Xiphorhynchus susurrans*.

SITTASOMUS AMAZONUS Lafresnaye.

Sittasomus amazonus Lafr., Rev. Zool. 1850. p. 509, 590; Berlepsch & Hartert, p. 62.

Sittasomus sylvicellus amazonus Hellmayr, Novit. Zool. XVII: 1911: p. 323 (Caura, Venezuela).

Not observed by the writer, but Berlepsch and Hartert record it from Suapure on the Caura River.

GLYPHORHYNCHUS CUNEATUS CUNEATUS (Lichtenstein).

Dendrocolaptes cuneatus Licht., Abh. Kön. Akad. Wiss. Berl. 1820. p. 204, Pl. 2, fig. 2.

Glyphorhynchus cuneatus Berlepsch & Hartert, p. 62.

Common at the falls of Maipures and beyond. Specimens were collected at Maipures, Nericagua, Munduapo and Capuano. Berlepsch and Hartert record specimens from Suapure, La Pricion and Nicare on the Caura River.

GLYPHORHYNCHUS CUNEATUS CASTELNAUDI Des Murs.

Glyphorhynchus castelnaud. Des Murs, Voy. Casteln. Ois. 1855: p. 47 (Santa Maria, Peru).

Chapman (MS) has identified four examples from the foot of Mt. Duida (upper Orinoco) as pertaining to this race.

XIPHORHYNCHUS GUTTATUS SORORIA (Berlepsch & Hartert).

Dendroornis rostriplallens sororia Berlepsch & Hartert, Novit. Zool. IX. 1902. 63 (Type, Maipures, Orinoco River).

D[endroornis] guttata sororia Hellmayr, Novit. Zool. XIV: 1907: 59 (Orinoco and Caura rivers).

This new form of Woodhewer was first observed at Quiribana de Caicara, where two specimens were taken in April, 1898; but it was rarely seen until beyond the falls of Atures, beyond which point it was abundant. In habits it did not seem to differ from its congeners, being strictly a bird of the thick forest. Specimens were collected at Quiribana de Caicara, Bichaco, Perico, Maipures and Munduapo, also one is included by Berlepsch and Hartert from Suapure on the Caura River.

In the American Museum collection are two specimens taken by Klages on the Caura River; a male at Maripa, January 24th and a female at La Union, September 26th.

XIPHORHYNCHUS GUTTATUS GUTTATOIDES (Lafresnaye).

Nasica guttatoides Lafresnaye Rev. et Mag. Zool. 1850: 387 (Lorette, Peru).

Dendroornis rostriplallens sororia Berlepsch & Hartert, Novit. Zool. IX: 1902: 63 (in part—Nericagua, Orinoco).

Dendroornis guttata guttatoides Hellmayr, Novit. Zool. XIV: 1907: 59 (Nericagua; crit.).

The American Museum collection contains specimens from the foot of Mt. Duida.

XIPHORHYNCHUS SUSURRANS SUSURRANS (Jard.).

Dendrocolaptes susurrans Jardine, Ann. Mag. Nat. Hist. XIX. 1847. p. 81.

Dendroornis susurrans jardinei Hellmayr, Novit. Zool. XIII. 1906. p. 30 (Orinoco delta, Guanoco).

Beebe collected two specimens at Guanoco, in the delta region, that are inseparable from the Brooklyn Museum series of *N. susurrans susurrans* from Carenage, Trinidad. The characters cited by Hellmayr in his Birds of Trinidad as distinguishing the birds of the Orinoco delta from those of Trinidad, do not seem to be constant, one of Beebe's specimens having the throat as whitish (not buff) as any example from Trinidad. Beebe's other specimen showing considerable buff on throat and remaining light spots on under parts is readily matched by Trinidad specimens.

This species was not observed by the writer.

XIPHORHYNCHUS LINEATOCAPILLUS (Berl. & Lever.).

Dendroornis lineatocapilla Berlepsch and Leverkühn, Ornith. 1890: p. 24 (Type ex Angostura, Orinoco).

I have not seen examples of this species.

XIPHORHYNCHUS PARDALOTUS (Vieillot).

Dendrocopos pardalotus Vieill., Nouv. Dict. XXVI. 1818. p. 117.

Dendroornis pardalotus Berlepsch & Hartert, p. 64.

Rare, seen only on the upper river where three specimens were taken during March and April at Nericagua.

Berlepsch and Hartert report specimens collected at Suapure and at La Pricion on the Caura River.

The American Museum collection contains specimens from La Union and Suapure on the Caura River that agree with Brit. Guiana specimens. There are also examples from the foot of Duida (Miller Col.).

XIPHORHYNCHUS OBSOLETUS NOTATUS (Eyton).

Picolaptes notatus Eyton, Contr. Ornith. 1852. p. 26 (Rio Negro, apud Berl. & Hart.).

Dendroornis obsoleta notata Berlepsch & Hartert, p. 64.

Rare on the lower Orinoco from Altagracia and Caicara up as far as the first falls, but common from the vicinity of Maipures onward. On the 1907 expedition, observed and collected on the San Feliz River near its junction with the Cuchivero River, and included in the Berlepsch and Hartert paper from Suapure and La Pricion on the Caura River.

In the American Museum are Caura River specimens collected by Klages at Suapure and the mouth of the Malo River.

Eye seal brown; bill above dusky fawn color, below ecru drab; feet olive greenish or greenish gray.

DENDROPLEX PICUS PICUS (Gmelin).

Oriolus picus Gm., Syst. Nat. I. 1788. p. 384.

Dendroplex picus Berlepsch & Hartert, p. 65.

Three taken at Ciudad Bolivar, two females April 13th, male, April 14th.

On my previous expedition not observed until I had reached Perico in the neighborhood of the falls of Atures.

DENDROPLEX PICIROSTRIS (Lafresnaye).

Dendrocolaptes picirostris Lafr., Rev. Zool. 1847. p. 76.

Dendroplex picirostris Berlepsch & Hartert, p. 65.

Not uncommon in the heavily timbered areas bordering the river. Observed and collected at Ciudad Bolivar, Altigracia and Caicara. Specimens display a considerable variation in color, especially on the under parts, where the throat in a female, taken April 29th, is a deep buff; in the male, taken May 8th (both collected at Caicara), it is a pale cream color. All display a reddish brown wash on the belly, very prominent in the male taken June 3rd and faintly indicated in the one taken May 8th.

A set of three fresh eggs, together with the male parent bird, was taken May 8th. The eggs are white, without gloss and between an elliptical oval and an oval in form and measure 27.2×20.2 ; 25.5×19.6 and 26.5×20.2 mm. The nest was at the bottom of the hollow centre of an old stump, about 40 cm. down. No nesting material had been carried in.

A second set of two eggs was taken with the parent bird (female) May 11th. One of these eggs is elliptical ovate and the other ovate in form. They measure 28.3×19.6 and 27.5×20.5 mm. This nest was at the bottom of a natural hollow in a tree trunk about 1.25 metres from the ground. Bits of rather thick bark from 15 to 50 mm. across had been carried in to fill up the lower part of the cavity which communicated with a hollow at the foot of the tree. The eggs were about 40 cm. down from the opening and I obtained them by digging out the bottom of the nest! June 3rd I noted that the lower part of the hole in this tree had again been filled with bits of bark.

On going a little nearer, a Woodhewer of this species, a male, flew from the opening and examination revealed three fresh eggs at the bottom of the cavity. These eggs are slightly smaller than the two preceding sets, short ovate in form, and measure 24.4×19 ; 23.6×19 and 23×19 mm.

XIPHOCOLAPTES ORENOCENSIS Berlepsch & Hartert.

Xiphocolaptes orenocensis Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 65.¹

Four specimens of this interesting new species were taken, three at Munduapo and one at Nericagua. No others were seen.

PICOLAPTES ALBOLINEATUS (Lafresnaye).

Dendrocolaptes albolineatus Lafr., Rev. Zool. 1846. p. 208.

Picolaptes albolineatus Berlepsch & Hartert, p. 66.

This species is not common but found all along the lower and middle stretches of the river as far as the mouth of the Apure River.

Eye seal brown; maxilla blackish at base, ecru drab at tip, mandible pale grey; feet dusky pea green.

A female taken at Ciudad Bolivar April 15th had a nearly developed egg in the oviduct.

NASICA LONGIROSTRIS (Vieillot).

Dendrocopus longirostris Vieill., Nouv. Dict. XXVI. 1818. p. 117.

Nasica longirostris Berlepsch & Hartert, p. 66.

Not uncommon on the upper river at the first falls and beyond.

CAMPYLORHAMPHUS TROCHILIROSTRIS (Lichtenstein).

Dendrocolaptes trochilirostris Licht., Abh. Kön. Akad. Wiss. Berl. 1820.

pl. 27. fig. 3.

For the benefit of those who may not have access to the Novitates Zoologicae, I reproduce the original description and observations on this species.

"Xiphocolaptes orenocensis sp. nov.

X. corpore supra obscure olivaceo rufo-brunneo, pileo nigrescente, pilei nuchaque plumis lineis angustis fulvo-albis scissis; infra rufis. gula rufescente alba; oris interioribus rufis; capitis pilis lateribus fulvescentibus rufo-brunneis, colli inferioris pectoris ventrisque superioris capitisque laterum plumis stria mediana fulvo-alba signatis, abdominis medii plumis maculis pogonio utroque tribus nigris (fasciis instar) praeditis, alis caudaeque obscure castaneis, rostro albo-corneo.

"Habitat: in vic. locorum Nericagua et Munduapo dictorum, Orinoco.

"Typus: in Mus. Tring. ♂ Nericagua, no. 12484 (Cherrie coll.) * * * This quite distinct new species has a very long and powerful bill, agreeing in form nearly with that of *X. major*, while in its coloration it resembles most *X. promeropirhynchus*, differing, however, in its darker back, and the more rufous brown, less olivaceous tint of the lower parts of the body, as well as in the much darker chestnut of its tail and wings.

"(X. emigrans of Central America is smaller, and is easily distinguished by the much lighter tail, while the color of the upper surface is not so very different)."

Xiphorhynchus trochilirostris Berlepsch & Hartert, p. 67.

Rare. Observed only in the belt of heavy forest bordering the river.

Specimens taken at Altigracia, Caicara and Quiribana de Caicara.

Eye dark sepia brown; bill hazel brown; feet olive green.

DENDROCINCLA MERULA (Lichtenstein).

Dendrocolaptes merula Licht., Abh. Kön. Akad. Wiss. Berl. 1820. p. 208.

Dendrocinclla merula Berlepsch & Hartert, p. 67; Oberholser, Proc. Ac. Nat. Sci. Phila. LVI; 1904; p. 456 (Suapure).

Rare, observed and collected at Munduapo and Nericagua on the upper river. In the American Museum collection are specimens taken at Suapure on the Caura River by Klages. Berlepsch and Hartert also record it from Suapure and as well as from Nicare on the Caura River.

DENDROCINCLA MERULOIDES PHAEOCHROA Berlepsch & Hartert.

Dendrocinda [sic] *phaeochroa* Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 67 (Type, ♂ Munduapo, Orinoco River).

Dendrocinclla olivacea phaeochroa Oberholser, Proc. Acad. Nat. Sci. Phila. LVI. 1904. p. 458 (Suapure, La Union, Caura River, Venezuela).

D[endrocinclla] meruloides phaeochroa Hellm. P. Z. S. Pt. IV: 1911: p. 1156.

This species is closely related to *D. merula* but while the other is rare this is the common *Dendrocinclla* of the region. Observed only on the upper river.

As there are probably many who do not have access to Berlepsch and Hartert's paper, I have thought it might be worth while to reproduce their original description and remarks on this species which are given below¹.

Dendrocinda phaeochroa sp. nov.

"*D. D. meruloides* Latr. i dictae affinis, sed paulo maior et corpore supra subtusque obscure olivaceo-brunneo, minus rufescente tincto, necnon gula sordide albescente (nec gula collo concolore) distinguenda.

"♂ ad. 168, 109, caud. 91, culm. 29, tars. 24¹, mm.

"♀ ad. 166, 107, 108, caud. 86, 86¹, 87, culm. 28¹, tars. 24¹, mm.

"Type: ♂, Munduapo 10. II. 1900 (no. 11895 Cherrie coll.)

"Habit. Ad flumina Orinoco et Caura dicta.

"This new species differs from *D. meruloides* from Venezuela (Cumana, San Esteban, etc.), in its less reddish, darker and more olivaceous brown color, its distinctly whitish upper throat and slightly larger dimensions. It differs from *D. merula*, which occurs in the same localities, by its larger bill with a brownish, less blackish upper maxilla, more olivaceous, less rufous upper wing-coverts, lighter color above and below, less contrasting, less chestnut-rufous under tail-coverts, and paler under wing-coverts and lining of the quills.

"It is most interesting to find *D. merula* and *D. phaeochroa* in the same localities. Hartert hesitated for some time to recognize them as two species, but he is now, together with Berlepsch, fully convinced of the correctness of their differentiation."

DENDROCOLAPTES CERTHIA (Boddaert).

Picus certhia Bodd., Tabl. Pl. Enl. 1783, p. 38.

Dendrocolaptes certhia Berlepsch & Hartert, p. 68.

Common on the upper river. Observed from near the mouth of the Meta River up as far as specimens were collected at Malaben, Nericagua and Munduapo.

Berlepsch and Hartert record specimens collected at Suapure, Nicare and La Pricion on the Caura River.

FORMICARIIDAE—ANT-THRUSHES.

Berlepsch and Hartert's paper listed forty-two species and subspecies as representatives of sixteen genera. Of that number, the writer collected twenty-eight species and subspecies pertaining to fourteen genera, on the Orinoco proper.

Fifty-six species and subspecies are included in the present list, and there is no doubt that a good many more will be added to the list as soon as careful collecting will have been done throughout the entire region.

As was to have been expected, since the Ant-thrushes are chiefly birds of the thick forest, members of this family were not found abundantly either as species or as individuals, until after we had penetrated to the heavily forested regions of the upper Orinoco.

In all my experience as a collector, I have learned but little regarding the nesting habits of birds of this group and regret to be able to add so little at the present time.

KEY TO GENERA, SPECIES AND SUBSPECIES OF FORMICARIIDAE.

- a. "Second phalanx of middle toe entirely free from outer toe; acrotarsium more or less distinctly scutellate (at least on inner side)."¹
 - b. Posterior edge of planta tarsi rounded (not booted) *Rhopolerpetorquata torquata*.
 - b'. Posterior side of planta tarsi with a sharp edge.
 - c. "Nostrils oval or rounded and without operculum (or if present not well developed) or other adjacent soft membrane."²
 - d. Conspicuously barred above and below.
 - e. Crown and occiput uniform black or hazel brown (no white bases to crown or occiput feathers) *Cymbilaimus lineatus lineatus*.
 - e'. Crown and occiput black, feathers with white bases ♂ *Thamnophilus doliatus*.
 - d'. Not conspicuously barred either above or below.
 - e. Wing coverts without white tips or other markings (males of *T. murinus* have nearly obsolete small pale tips to wing coverts³, and usually uniform with outer edges of quills.
 - f. Wing more than 65 mm.
 - g. Under parts white ♀ *Taraba major albicrissa*.

¹From Ridgway's "Key to the Genera of Formicariidae" Birds of N. and M. Amer. V.: 1911: p. 10.

²Ridgway l. c.

(*Cymbilaimus*, *Pygiptila*, *Hypolophus*, *Thamnophilus*, *Scoteria*,^o *Erionotus*, *Rhopochares*, *Dysithamnus*.)

³Mr. Ridgway in his "key" to the Formicariidae placed *Scoteria* tentatively in the section having the second phalanx of the middle toe partly united to the outer toe and the acrotarsium fused, but I find in the two forms examined (*S. argentata* and *S. schistacea saturata*) that the second phalanx of the middle toe is entirely free from the outer toe and the divisions of the acrotarsium are not obsolete.

- g'. Under parts not white.
 h. General color of under parts slate gray ♂ *Dysithamnus ardesiacus ardesiacus*.
 h'. General color of under parts ochraceous buff (it may be clear or dusky).
 i. Upper parts bright hazel brown, or olive brown.
 j. Hazel brown above ♀ *Thamnophilus doloiatus*.
 j'. Olive brown above ♀ *Dysithamnus ardesiacus saturninus*.
 j'. Upper parts slate color ♂ *Pygiptila stellaris*.
 f'. Wing not more than 65 mm.
 g. General color above gray (slate gray or olive gray).
 h. Middle of belly pale yellowish ♂ *Dysithamnus agouti andrei*.
 h'. Middle of belly pale grayish (whitish) ♂ *Thamnophilus murinus*.
 g'. General color above olive or olive brown and crown and occiput tawny olive.
 h. Larger, tail $\frac{2}{3}$ as long as wing or more; under parts pale buffy brownish ♀ *Thamnophilus murinus*.
 h'. Smaller, tail less than $\frac{2}{3}$ as long as wing; under parts pale grayish; buffy yellowish on crissum ♀ *Dysithamnus affinis andrei*.
 e'. Wing coverts with distinct white or buffy tips, or other pale wing markings.
 f. General color below white (immaculate); above black ♂ *Taraba major albicristata*.
 f'. General color below not immaculate white.
 g. Head all round and throat black ♂ *Hypolophus canadensis trinotatus*.
 g'. Sides of head and throat not black.
 h. General color of under parts a uniform gray (in shade varying from pale neutral gray to slate gray).
 i. Tertiaries and inner secondaries edged or tipped, or both, with white or pale gray.
 j. Crown and occiput black.
 k. Primary coverts narrowly tipped with white *Erionotus naevius naevius*.
 k'. Primary coverts not tipped with white *Erionotus insignis*.¹
 j'. Crown and occiput slate gray or gray mixed with hazel brown (♂ imm.) ♂ and ♀ imm. *Erionotus cruescens*.
 i'. Tertiaries and inner secondaries not tipped and edged (on outer webs) with white or pale grayish.
 j. Nearly uniform slate grayish above, no black on crown, wing-coverts with very small whitish apical spots ♂ *Thamnophilus murinus*.
 j'. Crown and nape black (and more or less black on the interscapulars) ♂ *Pygiptila stellaris*.
 k'. General color of under parts not uniform grayish.
 i. Chin, throat, and upper breast bright tawny ochraceous *Thamnophilus semicinctus*.
 i'. Under parts in general a uniform pale buff or tawny ochraceous; or striated with white on a gray ground, or buffy brownish on a grayish white ground.
 j. Tail cinnamon brown.
 k. White tip to tail-feathers confined to inner web except on two outermost rectrices (outer face of posterior half of tarsus with more or less oval scutes not closely joined to one another) ♂ and ♀ imm. *Erionotus cruescens*.
 k'. White tips to rectrices larger and not confined to inner webs of quills (outer face of posterior half of tarsus with nearly quadrangular scutes uniting with those from the opposite side in a sharp ridge) ♀ *Erionotus naevius naevius*.
 j'. Tail black or blackish brown.
 k. With an occipital crest; crown and occiput chestnut, sharply different in color from back. ... ♀ *Hypolophus canadensis trinotatus*.
 k'. No occipital crest, and color of crown and occiput not different from back.
 l. Slate gray (deep neutral gray) or slate black above.
 m. Smaller, wing less than 75 mm.; upper parts deep neutral gray ♂ *Sceleria argentata*.
 m'. Larger, wing more than 75 mm.; upper parts slate black ♂ *Sceleria schistacea caurensis*.
 l'. General color above rufescent brown or mummy brown.

¹I do not know of any records in the immediate Orinoco valley, but there is a good series from Cristobal Colon, Paria Peninsula (American Museum Collection), and as the type comes from British Guiana the species is probably found in intermediate localities.

- m. Larger, wing more than 75 mm.; top of head slate gray in sharp contrast with color of back *Setolera chrysolaema*.
- m'. Smaller, wing less than 75 mm. and top of head uniform with back *Setolera decentia*.
- "Nostrils more or less narrow and longitudinal, more or less distinctly operculate, or if broadly oval or roundish the remainder of nasal fossae occupied by membranous integument." . . . *Myrmotherula*, *Myrmeciza*, *Myrmecobora*, *Herpsilochmus*, *Ramphocelus*, *Certhioides*, *Thamnomanes*, *Myrmoborus*, *Hypocnemis*, *Haploerastria*, *Myrmeciza*, *Myrmecobora*, *Formicivora*.
- d. Bill long and slender, as long as head *Ramphocelus melanurus trinitatis*.
- d'. Bill not unusually long and slender, not as long as head.
- e. Outstretched feet reaching little if any beyond the tips of the under tail coverts *Thamnomanes glaucus*.
- e'. Outstretched feet reaching much beyond the end of the under tail coverts.
- f. A restricted, sharply defined, buff colored area at the base of the inner webs of the wing-quills.
- g. Entire top of head, forehead, crown and occiput rufous (the crown feathers tipped only with rufous) *Formicivora ruficeps*, *Formicivora celma celma*.
- g'. Wide frontal band black, crown and occiput rufous.
- e". No restricted, sharply defined buff colored area at base of inner webs of wing-quills.
- g. Distance from tips of under tail-coverts to tip of tail not greater (usually less) than length of bill, and lower back not marked with rounded white or buffy spots.
- h. Sides of face, lores and auriculars black.
- i. With broad frontal and superciliary stripe, white in males, rufous in females (no concealed white dorsal spot) *Myrmoborus leucophrys leucophrys*.
- i'. No frontal band and superciliaries narrow (a concealed white dorsal spot) *Myrmoborus myotherina myotherina*.
- k. Sides of face not black.
- i. Tertiaries and secondaries with cinnamon buff tips *Myrmotherula guttata*.
- i'. No cinnamon buff tips to tertiaries or inner secondaries.
- j. General color of under parts gray and throat practically uniform with breast.
- k. Slate gray below ♂ *Myrmotherula cineriventris cineriventris*.
- k'. Light neutral gray below ♂ *Myrmotherula cineriventris pallida*.
- j'. General color of under parts (gray) in sharp contrast with black or white throat; or with head and back conspicuously striated.
- k. Breast gray.
- i. A white shoulder patch.
- m. Tail-feathers narrowly tipped with white. ♂ *Myrmotherula longipennis*.
- m'. Tail not white tipped ♂ *Myrmopagis schisticolor*.
- i'. No white shoulder patch *Myrmoborus melanopogon*.
- k'. Breast not gray; and head and back striated.
- i. General color of under parts yellow (pale or lemon); and bill much more than one-half as long as tail *Myrmotherula pygmaea*.
- i'. General color of under parts white or buffy, and bill little if any more than one-half the length of the tail.
- m. Both maxilla and mandible black (females as well as males striated with black on underparts) *Myrmotherula cherriei*.
- m'. Mandible pale, maxilla black, females not strongly striated with black below *Myrmotherula surinamensis*.
- g'. Distance from tips of under tail-coverts to tip of tail greater than length of bill; or lower back marked with rounded white or buffy spots.
- h. Back more or less striated.
- i. Gray or grayish white below *Herpsilochmus sticturus sticturus*.
- i'. Throat and breast yellow or pale yellow.
- j. Smaller, breast not (or less) distinctly squamate *Hypocnemis flavescens humilis*.
- j'. Larger, breast more distinctly squamate *Hypocnemis flavescens flavescens*.

- h'*. Back not striated (no pale markings).
i. Greater and middle wing-coverts more or less conspicuously tipped, edged, or spotted with white, buff, or black.
j. None of the rectrices tipped or marked with white.
k. Lateral toes with claws not reaching to base of claw of middle toe.
l. Wing coverts with small white or whitish apical spots.
l'. Wing coverts with subapical black spots.
k'. Lateral toes with claws reaching to or beyond the base of the claw of the middle toe.
l. Feathers of chin and throat black, at least basally.
l'. Feathers of chin and throat not black, even at base.
m. Middle of back dusky gray, not greatly different from remaining upper parts.
m'. Middle of back rufous, quite different from remaining upper parts.
n. Throat ochraceous buff, remaining lower parts tawny olive.
n'. Throat pale (whitish), remaining lower parts gray or brownish gray.
j'. Some or all of the rectrices tipped or edged with white (in *C. tyrannina* the white tips to tail-feathers are almost obsolete).
k. General color of under-parts yellow or yellowish.
k'. General color of under-parts black, gray or pale buffy.
l. A concealed white dorsal spot.
m. General color, above and below, black.
n. General color, above and below, gray.
n'. Shoulder patch white.
n'. Shoulder patch slate gray like wing-coverts (pale markings on wing-coverts almost obsolete).
l'. No concealed white dorsal spot.
m. Back black or slate black.
m'. Back smoke gray or cinnamon brown.
n. Upper-parts cinnamon brown.
n'. Upper-parts smoke gray.
i. Greater and middle wing-coverts unmarked (some males of *Cercomacra cinerascens* have obsolete pale markings on coverts).
j. General color above and below slate gray.
j'. General color above and below not gray.
k. Dorsal concealed spot white.
k'. No concealed dorsal spot.
l. With hazel crown patch.
l'. No crown patch.
m. Above grayish olive.
m'. Above raw umber.
a. "Second phalanx of middle toe partly united to outer toe; acrotarsium fused (booted)"¹ (*Pithys*, *Hylophylax*, *Anoplops*).
b. Back marked either with rounded buff or white spots or narrow white, or buffy, apical bands to the feathers.
c. Markings on back rounded—white or buffy.
d. Back markings white.
d'. Back markings cinnamon buff.
c'. Back markings in the shape of narrow apical, white or cinnamon buff, bands to the feathers.
d. Apical margins to back feathers white.
e. Entire under parts including throat dark gray.
e'. Under parts ochraceous buff brightening to rufous on the throat and darkening to buffy brown on the flanks.
d'. Apical margins of back feathers cinnamon buff, (forehead, sides of head and chin ferruginous, remaining under parts gray).
- Myrmopagis atrothorax*.
Myrmeciza boucardi griseipectus.
♂ ad Myrmopagis haematonta haematonta.
♂ Myrmeciza schisacea.
Myrmopagis haematonta haematonta.
Terenura spodiopila.
Herpsilochmus frater.
♂ Cercomacra nigricans.
♂ Cercomacra tyrannina.
♂ Cercomacra cinerascens.
Myrmotherula melaena.
Microrhopias orenocensis.
Microrhopias cano-fumosus.
Cercomacra cinerascens.
♀ Cercomacra tyrannina.
Haplocercus meloryphus.
♀ Myrmopagis axillaris.
♀ Myrmopagis melaena.
♀ Myrmopagis schisticolor interor.
Hylophylax punctulata.
Hylophylax naevia naevia.
♂ Hylophylax poecilinota poecilinota.
♀ Hylophylax poecilinota lepidonota.
♀ Hylophylax poecilinota lepidonota.
♀ Hylophylax poecilinota poecilinota.

¹Ridgway, Birds N. & M. America, V: 1911: p. 16.

b'. Back without pale markings.

c'. Under parts bright chestnut (ad. ♂ chin, upper throat, lores, forehead and frontal crest white; immature with whole head and throat black with faint brownish wash)

Pithys albifrons.

c'. Middle of breast ochraceous buff, sides and flanks Dresden brown (chin, upper throat, and malar region rufous)

Anoplops rufigula palidus.

CYMBILAIMUS LINEATUS LINEATUS (Leach).

Lanius lineatus Leach, Zool. Misc. I. 1815. p. 20. Pl. 6.

Cymbilanius lineatus Berlepsch & Hartert, p. 68 (La Pricion, Nicare, Suapure, Caura River, Venezuela).

Not observed by the writer on the Orinoco proper, but collected at various points on the Caura River by Klages and by André.

The American Museum collection contains specimens from Suapure and La Union on the Caura River. Collected by Klages.

TARABA MAJOR ALBICRISSA (Ridgway).

Thamnophilus albicrissus Ridgw., Proc. U. S. N. M. XIV. 1891. p. 481.

Thamnophilus major albicrissus Berlepsch & Hartert, p. 68.

Not common, but observed all along the river from Las Barrancas in the delta region, below Ciudad Bolivar to the upper river.

Eye madder-brown; bill blackish, slate at base of mandible; feet plumbeous.

THAMNOPHILUS LUNULATUS (Lesson).

Lanius lunulatus Less., Traité d'Orn. p. 375. Pl. 45. fig. 2.

Thamnophilus lunulatus Berlepsch & Hartert, p. 68.

Recorded by Berlepsch and Hartert from Suapure on the Caura River.

THAMNOPHILUS POLIONOTUS Pelzeln.

Thamnophilus polionotus Pelz., Zur. Orn. Bras. II. 1868. p. 147.

Thamnophilus sp. inc. Berlepsch & Hartert, p. 69 (La Pricion and Nicare, Caura River, Venez.).

Thamnophilus polionotus Hellmayr, Novit. Zool. XIII. 1906. pp. 338-339 (La Pricion and Nicare, Caura River, Venez.).

Not observed on the Orinoco but recorded from its tributary, the Caura, from La Pricion and from Nicare.

Mr. Hellmayr (*l. c.*) gives a good account of this species compared with allied forms.

THAMNOPHILUS CINEREONIGER Pelzeln.

Thamnophilus cinereoniger Pelz., Zur. Orn. Bras. 1870. pp. 76, 143; Berlepsch & Hartert, p. 69.

First observed at Altagracia where it was rare, and not noted as common until I had gone beyond the second falls at Maipures.

THAMNOPHILUS MURINUS Sclater & Salvin.

Thamnophilus murinus Scl. & Salv., P. Z. S. 1867. p. 756; Berlepsch & Hartert, p. 69.

Not observed on the Orinoco proper but recorded from its tributary the Caura River from Suapure, La Pricion and La Union.

ERIONOTUS NAEVIUS NAEVIUS (Gmelin).

Lanius naevius Gm., Syst. Nat. I. 1788. p. 308.

Thamnophilus naevius Berlepsch & Hartert, p. 69.

Found along the middle river from Altagracia as far as I extended my collecting on the upper river. Common above the falls. Also recorded by Berlepsch and Hartert from La Pricion, La Union and Suapure on the Caura River.

ERIONOTUS CINEREICEPS (Pelzeln).

Thamnophilus cinereiceps Pelz., Zur. Orn. Bras. 1870. pp. 77, 145; Berlepsch & Hartert, p. 70.

Not seen below the neighborhood of the falls of Atures. Common from that point beyond.

In the American Museum collection are specimens from Boca de Sina, Rio Cunucunuma, upper Orinoco.

HYPOLOPHUS CANADENSIS TRINITATIS (Ridgway).

Thamnophilus trinitatis Ridgw., Proc. U. S. N. M. XIV. 1891. p. 481.

Thamnophilus canadensis trinitatis Berlepsch & Hartert, p. 70 (in part).

This form of *H. canadensis* seems to be found throughout the delta region of the Orinoco, and all specimens that I have seen from points on the Caura River (there is a fair series in the American Museum, collected by Klages at Maripa and Mato River), and four specimens collected by the writer on the San Feliz River near its entrance into the Cuchivero River, are typical *trinitatis*.

While the characters separating *H. c. canadensis* and *H. c. trinitatis* are not great, nevertheless they seem to me sufficiently constant for one to be justified in recognizing *trinitatis* as a subspecific form. In a series of sixteen females from Trinidad, the Caura River, middle and lower Orinoco regions, not one has the crown as light as in two specimens from Cayenne. In the Cayenne birds the crown is almost clear russet, while in the others the average is nearer a chestnut. The under parts of specimens (females) from Trinidad, Caura River and Orinoco delta, average decidedly more buffy, or better perhaps buffy clay color, the wash of the color extending over the entire under parts including the centre of the abdomen.

Birds from the middle Orinoco, from Ciudad Bolivar, and beyond, are intermediate in general color between the Cayenne birds and those from Trinidad, the Orinoco delta, and Caura River points, being as a series, at once distinguishable by their paler coloring both above and below. This pale coloring is perhaps more marked in the females, but is very evident in the males also when compared as a series. So characteristic does this paler form seem of the middle Orinoco region that I would designate it as

HYPOLOPHUS CANADENSIS INTERMEDIUS subsp. nov.¹

The nesting season on the middle Orinoco is evidently a long one, as I have found young birds in the nest in June, and fresh eggs in September. The nest is a thin walled, rather loosely, though neatly woven cup, suspended between the forks of a horizontal twig. Nesting sites are similar to those of our Red-eyed Vireo. Two eggs collected September 4, 1898, at Santa Barbara (near the mouth of the river Carcupaparo, or sometimes called the Sinaruco) were "short ovate in form, glossy white, covered with frequent red-brown spots, in color and measured 21 x 16 and 20.5 x 16 mm²."

A male in juvenal plumage, that cannot have been long out of the nest, taken at Caicara, June 15, 1907, closely resembles the adult female above and below, but there are no mesial blackish streaks on the breast.

Another example, a male in transitional plumage from the juvenal stage to that of the adult, is similar below to the adult female, and above differs from the adult only in having the crown parti-colored, a few

¹ Type in collection of Brooklyn Institute Museum No. 9671. Type locality, Orinoco, Para, Venz. May 9, 1905 (No. 13669, Cherrie collection).

² Berlepsch & Hartert, Novat. Zool. IX, 1902, p. 107.

of the chestnut feathers of the immature being scattered among the new black ones of the adult plumage.

THAMNOPHILUS DOLIATUS DOLIATUS (Linnaeus).

Lanius doliatus L., Syst. Nat. ed. 12 I. 1766. p. 138.

A male and female taken at Ciudad Bolivar, April 14th and April 8th, respectively, are referable to typical *doliatus*. Specimens from Las Barrancas are also referable to the typical form which ordinarily is distinguished at a glance from the common Orinoco form by the general darker color, narrower white and broader black bars in the male and deeper rufous in the female. However, there are occasional specimens from the lower Orinoco and delta regions that are somewhat intermediate in character and can be referred to one or the other only arbitrarily.

THAMNOPHILUS DOLIATUS FRATERCULUS Berlepsch & Hartert.

Thamnophilus doliatus fraterculus Berlepsch & Hartert, p. 70.

Abundant, both at Ciudad Bolivar and at Caicara.

Eye straw yellow; bill black above, plumbeous below; feet plumbeous.

The white bars on the under parts are very noticeably wider than in examples of *T. doliatus doliatus*, making the under parts generally much lighter. A nest containing two young was found June 30. It was located in a clump of open timber, very near a much frequented path. The nest was placed like that of *Vireosylva olivacea* between the forks near the end of a small branch about one metre from the ground. The bowl of the nest was as large as that of an American Robin. Grass stems and rootlets were the only materials used.

A nest without eggs taken at Caicara July 4, 1898, by Mrs. Cherrie, was situated in a small sapling that stood in an open glade of the forest. This nest was about one metre from the ground suspended between the horizontal forks of a slender twig and measured 10 cm. outside diameter by 7 cm. inside; 5.5 cm. in depth outside, by 4 cm. inside. Fine dry grass and long narrow strips of some soft inner bark is employed for the outside while there is an inner lining of horse-hair-like vegetable fibres. The whole is so loosely woven that eggs could be easily seen through the nest walls.

A second nest containing two young, taken at Caicara by the writer June 21, 1907, was in a region covered with dense thickets, having only a few large trees scattered here and there. The nest was suspended

between horizontal forks of a limb of a tree known as *Caña-tostola*; it was about 1.52 m. from the ground and just above a thicket of thorny vines that would have effectually protected it from most predatory animals. In the materials employed, and in shape it is similar to the nest described above and just as loosely and openly woven. The greatest diameter of the nest cavity is just below the edge which is contracted on the two sides by the branches of the fork and at the outer edge, between the forks, by the drawing in of the nest wall, a condition which would have prevented the eggs being thrown out had the branch swayed about a great deal.

Of the two young taken with this nest, a male and a female, the latter was considerably the larger and must have been a couple of days the older. Ordinarily where there is any decided difference in the plumages of adults, the young in juvenal plumage will bear a greater resemblance to the female than to the male. In the specimens before me the pattern of coloration is that of the male in both the male and the female. The general color above is tawny ochraceous, inclined to russet on the crown, rather broadly barred with blackish or dusky black; in short, they differ from the adult male chiefly in the lack of a lengthened crest and in the replacing of the white by ochraceous. Below, they are a pale ochraceous buff, that fades into almost pure white on the abdomen, narrowly barred with dusky on the breast and sides, darkest on the upper breast, faintly showing on the flanks and entirely absent on the abdomen.

Pygiptila stellaris (Spix).

Thamnophilus stellaris Spix, Av. Bras. II. 1825. p. 27. Pl. 36, fig. 2.

Pygiptila maculipennis Berlepsch & Hartert, p. 71 (Munduapo, Nericagua, Orinoco River), in part.

Pygiptila stellaris Hellmayr, Novit. Zool. XII. 1906. p. 367.

Noted only on the upper river, above the second falls, where it was not uncommon at Munduapo and Nericagua. Berlepsch and Hartert also record it from La Union and La Pricion on the Caura River.

There are two specimens in the American Museum collection collected by Klages at La Union on the Caura River, Venezuela, that I am unable to identify with certainty. They may or may not belong to the same species; I am, however, strongly of the opinion that they represent distinct forms. They have both been marked as males by the collector, in one case, however, with a question. Below I give a brief description of each of the specimens.

No. 76025 American Museum Collection (♂ ? La Union, Caura Riv. Venez. S. M. Klages leg.).

Thamnophilus sp. ?

♂ ? La Union, Caura River, Venez. 18 Oct. 1901. Leg. S. M. Klages (No. 76025 Am. Mus. Nat. Hist. Coll.).

Entire upper parts grey (almost slate). A concealed white spot in centre of back. Outer webs of primaries dark russet or raw umber, wing coverts narrowly tipped and edged with same color. General color of under parts a pale cinnamon brownish or buff, much clearer and paler on the throat and clearer brown (a wood brown) on the under tail coverts, sides and flanks grey with brownish buff wash. Inner edges of wing quills cinnamon, under wing coverts brighter, more ochraceous.

W. 77 T. 40 B. 18 T.s 20

Thamnophilus sp. ?

♂ La Union, Caura River, Venez. 27 Sept. 1901. Leg. S. M. Klages (76020 Am. Mus. Coll.).

Above, crown and middle of back slate grey, large concealed white patch in centre of back; wings black, outer webs of quills largely or entirely uniform slate grey, primary coverts black with small white terminal spots; greater, median and lesser coverts also blackish with white terminal spots. The outer webs of the greater coverts are largely slate grey. Tail slate grey. Below cinereous. Inner edges of some of the wing quills faintly rufous.

W. 81 T. 46 B. 20 T.s. 20.

DYSITHAMNUS ARDESIACUS SATURNINUS (Pelzeln).

Thamnophilus saturninus Pelz., Orn. Bras. p. 147. 1869. (Borba).

Dysithamnus ardesiacus Scl. & Salv. P. Z. S.: 1867: p. 756 (Rio Napo);

Berlepsch & Hartert, p. 71 (Munduapo, Nericagua, Orinoco River).

Dysithamnus ardesiacus saturninus Hellmayr, Verh. Zool.-bot. Ges. Wien.

LIII. 1903. p. 216 (Caura River).

Not seen by the writer along the Orinoco but recorded by Berlepsch and Hartert from various points on the Caura River.

In the American Museum collection are two specimens collected by Klages at Suapure on the Caura River, and one collected by André at Nicare.

DYSITHAMNUS AFFINIS ANDREI Hellmayr.

Dysithamnus affinis andrei Hellmayr, Novit. Zool. XIII. 1900. 31 (Type, ♀ ad ex Caparo, Trinidad).

Mr. C. William Beebe obtained a specimen at Guanoco in the Orinoco delta, which compared with examples from Trinidad, showed itself to be the island form.

THAMNOMANES GLAUCUS Cabanis.

Thamnomanes glaucus Cab., Wieg.-Arch. 1847. p. 230. Pl. 3; Berlepsch & Hartert, p. 71 (Munduapo, Nericagua, Bichaco, Orinoco River; Suapure, La Pricion, Nicare and La Union, Caura River, Venez.).

T[hamnomanes] c[aesius] glaucus Hellmayr, Novit. Zool. XIII. 1906. p. 368 (Orinoco region; Munduapo, Caura River).

T[hamnomanes] caesius glaucus Hellmayr, Novit. Zool. XIV. 1907. p. 65. (Munduapo and Bichaco, Orinoco River, Venez.).

Common on the upper Orinoco but not observed below the falls of Maipures.

In the American Museum is a series collected by Klages at La Union and Suapure on the Caura River.

I prefer to consider this as a distinct species and not as a race of *T. caesius* (Licht.) the large concealed white dorsal patch at once distinguishing it from *caesius caesius* and the two races *hoffmannsi* and *persimilis* of that species. Also I believe *T. caesius schistogynus* Hellmayr should be accorded specific rank, the much greater development of the rictal bristles (not mentioned by its describer) and the very differently colored female distinguishing it at once from other *Thamnomanes*.

MYRMOPAGIS SCHISTOCOLOR INTERIOR Chapman.

Myrmopagis schistocolor interior Chapman Bull. A. M. N. H. XXXIII: 1914: p. 614 (Type ex Buena Vista, above Villavicencio, Eastern Andes, Colombia) Suapure and Mato Riv.; Foot Mt. Duida, Orinoco Riv.

Mr. Chapman in discussing the races of *schistocolor* states that the specimens from the Upper Orinoco and from Caura river points are intergrades between *s. sanctae-martae* and *s. interior*. The upper Orinoco birds probably represent an undescribed form.

MYRMOPAGIS¹ AXILLARIS (Vieillot).

Myrmothera axillaris Vieill., Nouv. Dict. XII. 1817. p. 113.

Myrmotherula axillaris Berlepsch & Hartert, p. 73.

Not observed on the Orinoco proper, but recorded by Berlepsch and Hartert from Suapure, Nicare and La Pricion on the Caura.

MYRMOPAGIS MELAENA (Sclater).

Myrmotherula cherrieri Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 72

Myrmotherula melaena Berlepsch & Hartert, p. 74.

M[yrnopagis] melaena Ridgway Birds N. & M. Amer. V: 1911: p. 67 Crit.

Common along the upper river from the neighborhood of the first falls. This species was found breeding at Maipures in January, and the nest and eggs then collected have been described by Berlepsch and Hartert (*l. c.*), but as my observations made in the field are somewhat fuller, I reproduce the following notes from my journal.

The nest was situated about 2.13 m. above the ground in the midst of a thick tangle of overhanging bamboo branches, the bamboo thicket forming the undergrowth in the high, dense forest which borders the river in that region. The outer walls of the nest were composed of old and broken bamboo leaves, that were very loosely held together, and that served admirably to conceal the nest which was suspended by black thread-like vegetable fibres between the forks of a delicate twig of bamboo. The nest lining consisted of fine, thread-like vegetable fibres or rootlets.

The eggs are elliptical-ovate in form. When fresh the ground color was a delicate pinkish white, which after blowing became a dead white. They are dotted and covered with criss-cross, fine, short lines of heliotrope purple. The markings are heaviest at the point of greatest diameter and almost entirely absent about the smaller end.

The nest was discovered two days before it was collected and on each visit the male parent bird was found brooding, and sat so closely that I could approach and almost put my hand on him before he would desert his post. When he would finally flush, it was to slip quietly away and conceal himself in the surrounding thicket. On one occasion I waited for over an hour for his return but was disappointed, and finally the female came slipping noiselessly along toward

¹Ridgway, Proc. Biol. Soc. Wash. XXII. 1909. p. 69.

the nest, passing very near to me and pausing long enough to give me a quizzical look before reaching the nest and settling down on the eggs.

MYRMOTHERULA CHERRIEI Berlepsch & Hartert.

Myrmotherula cherriei Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 72
(Type, Perico, Orinoco River, Venez.).

The type of this species now in the Tring Museum was collected by the writer at Perico, just below the falls of Atures. The species was common there and also about Maipures, but was not noted elsewhere.

MYRMOTHERULA SURINAMENSIS SURINAMENSIS (Gmelin).

Sitta surinamensis Gm., Syst. Nat. I. 1788. p. 444.

Myrmotherula surinamensis Berlepsch & Hartert, p. 73.

M[yrmotherula] s[urinamensis] surinamensis Hellm. P. Z. S. Part IV: 1911; 1159 (Caura River Valley).

Only one specimen of this species was collected at Munduapo beyond the region where *M. cherriei* was abundant, owing to the fact that I confounded it with the preceding species.

The Tring Museum received specimens from Caura River points, collected by Klages and by André.

In the American Museum collection are specimens from La Union, Mato River and Maripa on the Caura River, collected by Klages.

MYRMOTHERULA PYGMAEA (Gmelin).

Muscicapa pygmaea Gm., Syst. Nat. I. 1788. p. 933.

Myrmotherula pygmaea Berlepsch & Hartert, p. 73.

Recorded by Berlepsch and Hartert from La Pricion, Caura River.

MYRMOTHERULA GUTTATA (Vieillot).

Myrmothera guttata Vieill., Gal. Ois. I. 1825. p. 251. Pl. 155.

Myrmotherula guttata Berlepsch & Hartert, p. 73.

Not observed on the Orinoco proper but recorded from La Union and La Pricion on the Caura River.

MYRMOTHERULA HAEMATONOTA (Sclater).

Formicivora haematonota Sclater, P. Z. S., 1857, p. 48.

Myrmotherula pyrrhonota Scl. & Salv. Nomencl. Av. Neotr. 1873. pp. 72, 160; Berlepsch & Hartert, p. 73.

Myrmotherula haematonota Hellmayr Novit. Zool. XIV: 1907: 71, 72 (Orinoco & Caura).

Abundant on the upper Orinoco, above the second falls.

Not observed elsewhere. Also recorded from Suapure, Nicare and La Pricion on the Caura River.

In the American Museum collection are specimens collected by Klages on the Caura River at Suapure and La Union during September and October.

MYRMOTHERULA LONGIPENNIS Pelzeln.

Myrmotherula longipennis Pelz., Zur. Orn. Bras. II. 1868. pp. 82, 153; Berlepsch & Hartert, p. 74.

Recorded from Suapure, Nicare, La Union and La Pricion on the Caura River, but not observed along the Orinoco.

MYRMOTHERULA CINEREIVENTRIS CINEREIVENTRIS Sclater & Salvin.

Myrmotherula cinereiventris Scl. & Salv., P. Z. S. 1867 p. 756 (Cayenne).

Specimen of *M. cinereiventris* in the American Museum collection from points in the Caura region (La Union, and Mato River) belong to the typical race and are conspicuously darker than is the Upper Orinoco race.

MYRMOTHERULA CINEREIVENTRIS PALLIDA Berlepsch & Hartert.

Myrmotherula cinereiventris pallida Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 74. (Type, Nericagua, Orinoco River, Venez.).

The writer collected the type of this subspecies at Nericagua on the upper Orinoco beyond the falls of Maipures, a short distance above the mouth of the Vicada River. The subspecies was abundant all along the Orinoco from near the mouth of the Meta River as far as I ascended. Specimens in the American Museum collection from the foot of Mount Duida belong to this race.

HERPSILOCHMUS RUFIMARGINATUS FRATER Sclater & Salvin.

Herpsilochmus frater Scl. & Salv., P. Z. S. 1880. p. 159.

Herpsilochmus rufimarginatus frater Berlepsch & Hartert, p. 75.

Not observed on the Orinoco, but recorded from Suapure on the Caura River. In the American Museum collection is an adult male from that point.

HERPSILOCHMUS STICTURUS STICTURUS Salvin.

Herpsilochmus sticturus Salvin, Ibis 1885. p. 424 (Bartica Grove, British Guiana).

In the American Museum collection is a specimen from Boca de Sina, Cunucunuma River, Upper Orinoco.

HERPSILOCHMUS STICTURUS NIGRESCENS Todd.

Herpsilochmus sticturus nigrescens Todd, Proc. Biol. Soc. Wash. XXVIII. 1915, 80 (Type ex Maripa, Rio Caura, Venez.).

I have not seen this race, that is said to differ from *s. sticturus* in having a greater admixture of black above and "under parts much darker, more grayish, the throat and breast indistinctly striped with dusky grayish and white."

MICRORHOPIAS CANO-FUMOSUS (Cherrie).

Formicivora cano-fumosus Cherrie, Sci. Bull. Bklyn. Inst. Mus. I. 1909, p. 387. (Type, ♂, ex Las Barrancas, Delta reg., Orinoco River, Venez.).

Observed and taken only in the type locality, where three males and three females were collected between July 30th and August 2nd.

MICRORHOPIAS¹ ORENOCENSIS (Hellmayr).

Formicivora orenocensis Hellmayr, Bull. Br. Orn. Cl. XIV. 1904. 54 (Type, ♂ ad: ex. Altagracia, Orinoco River, Venez.)

Formicivora intermedia Berlepsch & Hartert, p. 75.

Abundant along the Middle Orinoco from Ciudad Bolivar to Caicara. Keeps chiefly to the low thickets in heavily timbered regions.

Eye seal brown; bill above black, below slate color; feet slate color.

¹*Microrhopias* (Cherrie).

²*Microrhopias* Wood. Boitt. Nat. Hist. Bred., III., p. 1903, 1871. (Bartica).

Formicivora rufatra Sclater, Cat. Birds Brit. Mus. XV. 1890. p. 251 (Orinoco?) Recorded from the Orinoco, with a query by Sclater.

In the American Museum collection are specimens from points on the Caura River, which agree exactly with Ciudad Bolivar and Caicara specimens.

HAPALOCERCUS MELORYPHUS (Wied).

Euscarthmus meloryphus Wied, Beitr. Naturg. Bras. III. 1831. p. 947.

Hapalocercus meloryphus Berlepsch & Hartert, p. 40.

Rare. Only once met with by the writer, an adult female having been collected at Ciudad Bolivar April 8, 1905.

Eye seal brown; bill above black, below pale; feet grey.

The specimen secured was discovered perched low down on the limb of a tree at the edge of a small clump of trees and bushes on the savanna. In actions the bird was decidedly flycatcher-like; but the scutellation of the tarsus¹ is very like that of *Formicivora* and I am following Mr. Ridgway² in including it with the *Formicariidae*.

Berlepsch and Hartert record a single specimen collected by Klages that was taken at Ciudad Bolivar.

The outer and middle toes are united at the base for the length of the basal phalanx of the outer toe, and about one-half the length of the basal phalanx of the middle toe. Outer toe with claw slightly longer than the middle toe without claw; without claw reaching to about the middle of the subterminal phalanx of the middle toe.

TERENURA SPODIOPTILA Sclater & Salvin.

Terenura spodioptila Scl. & Salv., Ibis, 1881. p. 270. Pl. 9. fig. 1; Berlepsch & Hartert, p. 75.

Not observed on the Orinoco, but recorded from Suapure on the Caura River.

CERCOMACRA CINERASCENS (Sclater).

Formicivora cinerascens Sclater, P. Z. S. 1857 p. 131 (Rio Napo).

Cercomacra napensis Scl., P. Z. S., 1868. p. 572 (Rio Napo); Berlepsch & Hartert, p. 75.

Cercomacra cinerascens, Hellmayr Novit. Zool. XII: 1905: 287 (habitat and crit.).

¹The following observations were made as a result of an examination of a fresh tarsus, the acrotarsium covers somewhat more than the anterior half of the tarsus. On the plantar tarsi is a double row of elongated irregularly quadrate scutella extending from the heel to the toes; but from the point of the heel for a short distance down the double series is separated by a median row of small scutella. There is also a narrow non scutellate area along the inside face between the edges of the acrotarsium and the scutella covering the planta and a similar area on the outside at the upper end.

²Birds of North and Middle America IV. 1897: 339.

Taken by the writer on the upper river at Munduapo, but not noted elsewhere. It is also recorded from points on the Caura River.

CERCOMACRA TYRANNINA TYRANNINA (Sclater).

Pyriglena tyrannina Scl., P. Z. S. 1855. p. 90.

Cercomacra tyrannina Berlepsch & Hartert, p. 76.

Cercomacra tyrannina tyrannina, Ridgw. Bds. N. and M. Amer., V: 1911: 93 (Points on Orinoco and Caura rivers).

Abundant on the upper river from just below the falls of Atures as far as I ascended. Not noted elsewhere by me, but recorded by Berlepsch and Hartert from various points on the Caura River.

CERCOMACRA NIGRICANS Sclater.

Cercomacra nigricans Scl. P. Z. S. 1858. p. 245; Berlepsch & Hartert, p. 76.

Noted as abundant in the delta region at Las Barrancas but much less common along the middle stretches of the river up as far as the mouth of the Apure. Orinoco birds seem to be identical with American Museum specimens from the Caura River, Colombia. Santa Marta and from Panama.

SCLATERIA ARGENTATA (Des Murs).

Herpsilochmus argentatus Des Murs, Voy. Casteln, Ois. (1855). p. 53. fig. 2.

Sclateria argentata Oberholser, Proc. Phil. Acad. LI. 1899. p. 210; Hellmayr, Novit. Zool. XIV. 1907. p. 375 (Maipures, Orinoco).

Heteroenemis argentata Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 76 (part) (Maipures, Orinoco River).

Rare, met with at Maipures, only, during December. Specimens collected at La Union on the Caura River by André were also included under *H. argentata* by Berlepsch and Hartert, but have since been separated as a subspecific form of *S. schistacea* by Mr. Hellmayr.

SCLATERIA SCHISTACEA CAURENSIS Hellmayr.

Sclateria schistacea caurensis Hellmayr, Bull. Brit. Orn. Club. XIX. 1906. p. 9 (Type, ♂ ad. ex. Caura River, Venez.).

Heteroenemis argentata Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 76 (part)

S[clateria] s[chistacca] caurensis Hellmayr, Novit. Zool. XIV. 1907.
p. 376.

Not observed on the Orinoco proper.

MYRMECIZA LONGIPES GRISEIPECTUS Berlepsch & Hartert.

Myrmeciza longipes griseipectus Berlepsch & Hartert, Novit. Zool. IX.
1902. p. 76. (Type, ♂ ad. Caicara, Orinoco River, Venez. in
Museum Tring; Caicara, Perico and Munduapo, River Orinoco and
Suapure and La Pricion, Caura River.

M[yrmeciza] l[ongipes] griseipectus Hellmayr, Novit. Zool. XIII. 1906.
p. 33.

Eye bright chestnut; bill black; feet pinkish white.

This species was not noted below Caicara, but was observed on the upper river as far as I extended my explorations. It inhabits the thick forest, and while not rare it is more often heard than seen. It has a high flute-like whistle that is very difficult to trace. Birds may be very near, concealed in the thick underbrush, but as they walk rapidly away from one, the call notes seem to come from half a dozen different directions. I have never seen them anywhere except on the ground where they walk and run easily and gracefully over the fallen leaves, and when flushed fly but a short distance and again drop to the ground.

In the American Museum collection is a series collected by Klages at Suapure and Maripa on the Caura River.

MYRMECIZA SCHISTACEA Todd.

Myrmeciza schistacea Todd, Proc. Biol. Soc. Wash. XXVI: 1913: 172
(Type ex El Llagual, Caura district Venezuela).

I have not seen this species.

MYRMODERAS ATROTHORAX (Boddaert).

Formicarius atrothorax Bodd., Tabl. Pl. Enl. 1783. p. 44.

Myrmeciza atrothorax Berlepsch & Hartert, p. 77.

Myrmeciza atrothorax atrothorax Hellmayr, Verh. Zool. Bot. Ges. Wien,
LIII. 1903. p. 214.

Myrmoderus atrothorax Ridgw. Proc. Biol. Soc. Wash. XXII: 1907: 70.

Rare; seen by the writer on the upper Orinoco only at Munduapo. It is also recorded by Berlepsch and Hartert, from La Pricion, Nicare and La Union on the Caura River.

HYPOCNEMIS FLAVESCENS FLAVESCENS Sclater.

Hypocnemis flavescens Scl. P. Z. S. 1864 p. 609 (Marabitanas, Rio Negro, Brazil).

In the American Museum collection is a series from the neighborhood of the foot of Mt. Duida and Boca de Sina, Rio Cunucunuma (Upper Orinoco) that probably represent typical *flavescens flavescens*.

I am not at all sure that the Caura River form is sufficiently distinct to warrant separation but as pointed out by Mr. Todd the breast seems less distinctly squamate and apparently there is a slight difference in size, *f. humilis* being the smaller.

HYPOCNEMIS FLAVESCENS HUMILIS Todd.

Hypocnemis flavescens humilis Todd, Proc. Biol. Soc. Wash, XXVI: 1913: 172 (La Lajita, Caura, Venezuela).

Hypocnemis flavescens Berlepsch & Hartert, p. 77.

Not observed on the Orinoco proper, but recorded from Nicare, Suapure, La Lajita and La Pricion on the Caura River.

HYLOPHYLAX POECILONOTA POECILONOTA (Cabanis).

Hypocnemis poecilonota Cab., Weigm. Arch. 1847. p. 213. Pl. 4, fig. 2; Berlepsch & Hartert, p. 78.

Hypocnemis poecilonota poecilonota Hellmayr, Novit. Zool. XIII. 1906. p. 371 (Munduapo and Nericagua, Orinoco River, Suapure, Nicare, La Union and La Pricion, Caura River).

Hylophylax poecilonota Ridgway, Birds of N. & M. Am. V: p. 128.

Common about Munduapo and Nericagua. Also recorded by Berlepsch and Hartert, and by Hellmayr from points on the Caura River. In the American Museum there is a specimen from Suapure.

HYLOPHYLAX POECILONOTA LEPIDONOTA (Sclater & Salvin).

Hypocnemis lepidonota Scl. & Salv. P. Z. S. 1880 p. 160 Sarayaçu, E. Ecuador.

Miller and Iglseeder, collecting for the American Museum, at the foot of Mount Duida secured a series of specimens that I have referred to this race. The males, however, are paler below, light neutral gray (Ridgway's Color Standards), than are two other specimens, one from La Murelia, Caqueta, Colombia, and one from Zamora, Province de Loja, Ecuador, that are deep neutral gray. Two females are also lighter

in color than females from La Murelia with a greater suffusion of buffy on the under parts and more rufous or hazel above, particularly on the crown and occiput.

HYLOPHYLAX PUNCTULATA (Des Murs).

Rhopothera punctulata Des Murs, Voy. Casteln., Ois. p. 53.

Hypocnemis punctulata Hellmayr, Novit. Zool. XIV. 1907. p. 377 (La Pricion, Caura River, Venez.).

There is a pair in the American Museum collection from La Union, Caura Riv.

HYLOPHYLAX NAEVIA CONSOBRINA Todd.

Pipra naevia Gm., Syst. Nat. I. 1788. p. 1003.

Hypocnemis naevia Berlepsch & Hartert, p. 79.

H[ylophylax] naevia Ridgway. Birds of N. & M. Amer. V: p. 128.

Hylophylax consobrina Todd, Proc. Biol. Soc. Wash. XXVI: 1913: 172 (Rio Mocho, Rio Caura, Venezuela).

Not observed on the Orinoco, but recorded from La Pricion on the Caura River by Berlepsch and Hartert.

Miller and Iglseider collected a pair of birds at the foot of Mount Duida, Upper Orinoco (American Museum collection) that probably belongs to this race. I have however only a single example (from "Napo") that may be referred to *naevia naevia* for comparison. The differences are not marked, but perhaps sufficient to constitute a good race. The abdomen, flanks and under tail-coverts are pale buffy instead of dark ochraceous buff. The buffy spots on the mantle are also larger.

MYRMOBORUS LEUCOPHRYS (Tschudi).

Pithys leucophrys Tsch. in Weign. Arch. 1844. p. 18 (Peru. "Fluss Tulumayo").

Myrmoborus leucophrys Cab. et Hein. Mus. Hein. II: (1859): 9.

Hypocnemis leucophrys Berlepsch & Hartert, p. 78.

Common on the upper river above the falls of Maipures, also recorded from points on the Caura River by Berlepsch and Hartert.

MYRMOBORUS MYIOTHERINA MYIOTHERINA (Spix).

Thamnophilus myiotherinus Spix, Av. Bras. II. 1825. p. 30, Pl. 42, fig. 1.

Myrmoborus myiotherinus Cab. et Hein. Mus. Hein. ii (1859): 9.

Hypocnemis myiotherina Berlepsch & Hartert, p. 78.

Hypocnemis myiotherina myiotherina Hellmayr, Novit. Zool. XIV. 1907. p. 20.

Not noted on the Orinoco but recorded from its tributary the Caura, from La Pricion and Nicare.

MYRMOBORUS MELANOPOGON (Sclater).

Hypocnemis melanopogon Scl., P. Z. S. 1857. p. 130; Berlepsch & Hartert, p. 78; Hellmayr, Novit. Zool. XIV: 1907: 381. (Orinoco River and Caura River localities).

Not noted as common at any point, but observed all the way from Altagracia to above the falls. Also recorded by Berlepsch and Hartert from points on the Caura River, and in 1907 I found this species common along the San Feliz River near its junction with the Cuchivero River.

PITHYS ALBIFRONS (Linnaeus).

Pipra albifrons Linn., Syst. Nat. ed. 12. I. 1766. p. 339.

Pithys albifrons Berlepsch & Hartert, p. 79.

Rare, seen only on the upper river at Munduapo and Nericagua. Usually in company with other species of Ant-Thrushes and Wood-hewers following in the wake of the foraging ants.

Berlepsch and Hartert also record specimens from Suapure and Nicare on the Caura River.

ANOPLIPS RUFIGULA PALIDUS Cherrie.

Anoplops rufigula palidus Cherrie, Sci. Bull. Bklyn. Inst. Mus. 1909. p. 390 (Type, ♂ ex Suapure, Caura River, Venez.).

Similar to *A. rufigula rufigula* from Cayenne, but smaller and much less deeply colored above, being olive brownish with a slight rufous wash, while Cayenne birds are a deep rich umber brown with olive wash. The type specimen measures: wing 74 mm.; tail 47 mm.

RHOPOTERPE TORQUATA TORQUATA (Boddaert).

Formicarius torquatus Boddaert, Tabl. Pl. Enl. 1783. p. 43 (ex Dubenton Pl. enl. 700. Fig. 1.) (Type, ex Cayenne apud Berlepsch.)

There are two specimens in the American Museum collection secured by Klages at Suapure on the Caura River: ♂ September 11, 1901; ♀ February 8, 1901.

Not before recorded from the Orinoco region.

RAMPHOCAENUS MELANURUS TRINITATIS Lesson.

Ramphocaenus trinitatis Lesson, Rev. Zool. 1839, p. 42.

Ramphocaenus melanurus Berlepsch & Hartert, p. 79.

Rare on the Orinoco; two collected at Munduapo in February and one at Nericagua in April. Berlepsch and Hartert record it from the Caura River, and in the American Museum collection are specimens taken by S. M. Klages at Suapure and at Maripa on that river.

FORMICARIUS COLMA COLMA Boddaert.

Formicarius colma Bodd., Tabl. Pl. Enl. 1783, p. 44.

Formicarius nigrifrons Berlepsch & Hartert, p. 80.

Rare, two taken at Nericagua during March and April. A nest of this species, from which the parent was flushed, was found at Nericagua in March, 1899. It was a natural cavity in a tree trunk, about 5 metres from the ground. The cavity was about 40 cm. in depth and about 15 cm. in diameter. The bottom was lined with rootlets and dry grasses. The two eggs were pure white.

Recorded also from points on the Caura River by Berlepsch and Hartert.

In the American Museum collection are four specimens, one from El Llagual, and three from La Union, Caura River. These skins, three of which are labelled as females, indicate that the adult female is exactly similar to the adult males, i. e., without any white on chin or throat¹. One of the examples before me has the extreme upper throat and chin white and the throat flecked with white; another has a small chin spot only white, while the third is without any white.

An examination of Mr. Ridgway's type of *F. nigrifrons glaucopectus*² from British Guiana with the other examples of the same from the American Museum collection, compared with the Caura River specimens, indicates that *glaucopectus* is a well marked subspecies distinguished by the great extension of sooty blackish down over the chest and even onto the sides.

MYIOTHERA RUFICEPS (SPIX)

Myiothera ruficeps Spix, Av. Bras. i. p. 72, pl. 72 fig. 1, (1824).

A single specimen in the American Museum collection, taken by Klages at La Union, Caura River, Venez., evidently belongs to this

¹Hellmayr, Novit. Zool. XII, 1900, "we believed the throat of adult female to be white," sharply defined against the sooty grey breast."

²Proc. U. S. N. M. XVI. 1893, p. 673.

species. The specimen is a male and was taken September 26, 1901. The throat and anterior part of the malar region is ochraceous buff, but with many of the feathers tipped with blackish.

CONOPOPHAGIDAE—THE GNATEATERS.

Only a single species of those pertaining to this family has been recorded from the Orinoco region.

CORYTHOPIS TORQUATA ANTHOIDES (Pucheran).

Muscicapa anthoides Pucheran (ex Cuvier), Arch. du Mus. Par. VII (1855), p. 334.

Corythopis anthoides Berlepsch & Hartert, p. 80.

Rare; one specimen taken at Nericagua. There is a single specimen in the American Museum (Klages collection) from La Union on the Caura River—a female collected September 26, 1901.

TROCHILIDAE—THE HUMMINGBIRDS.

I was disappointed in the number of species of hummingbirds met with on the Orinoco River. Only twenty-eight were included in Berlepsch and Hartert's paper, twenty-two of which number were collected on the Orinoco proper by the writer, the remaining six were from the Caura River collected by Klages or André.

While the number of species secured was a disappointment, it is perhaps not remarkable when considered in connection with the fact that we devoted the greater part of our time to the more or less open savanna regions bordering the middle stretches of the Orinoco—a region of low altitude, characterized by great stretches of open or sparsely wooded savannas, and little variety in the vegetation.

GLAUCIS HIRSUTA HIRSUTA (Gmelin).

Trochilus hirsutus Gm., Syst. Nat. I. 1788. p. 490.

Glaucis hirsuta Berlepsch & Hartert, p. 80.

One taken at Munduapo.

PHOETHORNIS AFFINIS AFFINIS Pelzeln¹.

Phaethornis affinis Pelz., Sitz. Akad. Wien, XX. 1856. p. 157.

Phaethornis superciliosus Berlepsch & Hartert, p. 80.

Common on the upper river at Munduapo and Nericagua.

¹See Hellmayr's remarks regarding the use of this name, Novit. Zool. XIII. 1906. p. 374.

PHOETHORNIS HISPIDUS (Gould).

Trochilus hispidus Gould, P. Z. S. 1846. p. 90.

Phaethornis hispidus Berlepsch & Hartert, p. 81.

Common in the same general region as *P. affinis affinis*.

PHOETHORNIS AUGUSTI (Bourcier).

Trochilus augusti Bourc., Ann. Soc. Agric. Lyon, X. 1847. p. 623.

Phaethornis augusti Berlepsch & Hartert, p. 81.

Seen only at Caicara where two specimens were taken.

PHOETHORNIS RUPURUMII RUPURUMII Boucard.

Phaethornis Rupurumii Boucard, The Humming Bird, II. 1892. p. 1.

Berlepsch & Hartert, p. 81.

Colors of fresh birds are: eye seal brown; maxilla black, mandible lemon yellow, black at tip; feet dusky.

This species is found all along the middle and upper Orinoco and is not uncommon in the low, often almost impenetrable, thickets near the borders of deep forest areas. They keep close to the ground, and their color harmonizes so closely with stems of the vines and the branches of the undergrowth about them that they are rarely seen. I have sat for a half hour at a time hearing their oft-repeated squeaky hissing notes all about me, frequently within a very few feet of me, and have failed to see one of the performers.

PHOETHORNIS RUBER EPISCOPUS Gould¹.

Phaethornis episcopus Gould, P. Z. S. 1857. p. 14.

Phaethornis ruber Berlepsch & Hartert, p. 82.

Phaethornis caurensis Simon et Delmas, *Ornis*, XI. 1901. p. 208 (Caura River, Venez.).

Common at Munduapo and at Nericagua.

CAMPYLOPTERUS LARGIPENNIS (Boddaert).

Trochilus largipennis Bodd., Tabl. Pl. Enl. 1783. p. 41.

Campylopterus largipennis Berlepsch & Hartert, p. 82.

Abundant at Nericagua. Not seen elsewhere.

¹See Hellmayr's notes on the races of *P. ruber*: Novit. Zool. XIV. 1907. p. 375.

FLORISUGA MELLIVORA MELLIVORA (Linnaeus).

Trochilus mellivorus L., Syst. Nat. ed. 10. I. 1758. p. 121.

Florisuga mellivora Berlepsch & Hartert, p. 82.

Not observed at Bolivar and rare at Caicara where an adult male and an adult female were taken May 8th. Abundant on the upper river.

Eye seal; bill black; feet dusky blackish.

AGYRTRIA ALBIVENTRIS (Lesson). ^{GLIMMERING THROATED}
EMERALD

Ornismya albiventris Less., Hist. Nat. Ois.-Mouches, 1829. pp. XXXIV, 209. Pl. 76.

Agyrtia albiventris Berlepsch & Hartert, p. 83.

This is the most abundant species of Hummingbird found along the Orinoco up as far as the falls in the river. It is a bird of the open savanna regions.

Eye dark seal brown; bill dusky reddish with blackish tip; feet dusky.

I have found nests every month from May to November, and in localities as varied as the months—from a point out toward the extreme tip of a limb of a tree 20 metres up, to the forks of a slender shrub not more than 50 cm. above the ground. A nest before me is a neat, trim, little cup-shaped affair, built of the soft silky bits of native cotton adorned, on the outside, with scattered pieces of greenish gray lichens. It measures 4 cm. diameter by 2.8 cm. in depth outside, and 2.7 cm. diameter by about 1.8 cm. in depth inside. It was located about 1.6 m. from the ground near the tip of a large horizontal limb of a mango tree, at a point where a tiny twig branches from the main stem, the angles between the two forming the foundation for the nest. The egg (one of the set broken) is elliptical-oval in form and measures 13.2 x 8.8 mm.

AGYRTRIA FIMBRIATA (Gmelin).

Trochilus fimbriatus Gmelin, Syst. Nat. I: 1788: p. 493 (Cayenne).

Agyrtia fimbriata Stone, Proc. Ac. Nat. Sci. Phil. 1913: p. 201 (Boca Uracoa, and Buelta Trieste, River Manimo; Caño Corosal).

Reported from the delta country by Stone.

AGYRTIA MILLERI (Bourcier).

Trochilus milleri Bourc., P. Z. S. 1847. p. 43.

Agyrtia milleri Berlepsch & Hartert, p. 83.

The distribution along the Orinoco seems to be about the same as with *albiventris* but it is much less common.

AGYRTIA CHIONOPECTUS CHIONOPECTUS (Gould).

Thaumatius chionopectus Gould, Monogr. Trochili. V: (1859): pl. 293 (Trinidad); Stone, Proc. Ac. Nat. Sci. Phil. 1913: p. 201 (Guinipa Village; Pedernales).

Stone records specimens from the delta. It is replaced from the mouth of the Caura and beyond by the allied race *whitelyi*.

AGYRTIA CHIONOPECTUS WHITELYI (Boucard).

Uranomitra whitelyi Boucard, The Humming Bird, III. 1893. p. 8.

Agyrtia chionopectus whitelyi Berlepsch & Hartert, p. 84.

This species was reported from the Caura River by Berlepsch and Hartert, having been collected by both André and Klages. In May, 1907, the writer found it abundant along the San Feliz River near its union with the Cuchivero River. Either this or typical *chionopectus* will be very likely found in the Orinoco Delta.

SAUCEROTTIA CUPREICAUDA (Salvin & Godman).

Amazilia cupreicauda Salv. & Godm., Ibis, 1884. p. 452.

Saucerottia cupreicauda Berlepsch & Hartert, p. 84.

Berlepsch and Hartert record specimens from "Mountains west of Suapure," collected by Klages. Not observed by the writer.

SAUCEROTTIA ERYTHRONOTOS CAURENSIS Berlepsch & Hartert.

Saucerottia erythronotos caurensis Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 84. (Type in Museum Tring, ♂, Suapure, Caura River, Venez.).

The writer did not obtain specimens of this Hummingbird, but examples were sent to the Tring Museum from Ciudad Bolivar, and the type locality by S. M. Klages.

HYLOCHARIS SAPPHIRINA (Gmelin).

Trochilus sapphirinus Gm., Syst. Nat. I. 1788. p. 496.

Hylocharis sapphirina Berlepsch & Hartert, p. 84.

Seen only on the upper river at Nericagua, where it was abundant.

HYLOCHARIS CYANUS VIRIDVENTRIS Berlepsch.

Hylocharis cyanea viridiventris Berl., Ibis, 1880. p. 113.

Hylocharis cyanus viridiventris Berlepsch & Hartert, p. 85.

Three taken at Nericagua during April, 1899; not observed at other points along the Orinoco proper.

Recorded by Berlepsch and Hartert from Suapure and from La Pricion on the Caura River.

CHLORESTES COERULEUS (Vieillot).

Trochilus coeruleus Vieill., Nouv. Dict. VII. 1871. p. 361.

Chlorestes coeruleus Berlepsch & Hartert, p. 85.

Common from Altagracia to Munduapo on the upper river; also recorded from Caura River points by Berlepsch and Hartert.

Eye seal brown; maxilla and tips of mandible black, basal four-fifths of mandible flesh color; feet dusky.

CHLOROSTILBON CARIBAEUS NANUS Berlepsch & Hartert.

Chlorostilbon caribaeus nanus Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 86 (Type, ex Caicara River, Orinoco, Venezuela).

Abundant at Caicara, where the writer collected the type specimen (adult male No. 10157 Coll. Geo. K. and Stella M. Cherrie, Caicara, Venez. Feb. 19, 1898), now in the Tring Museum (*l. c.*). This species was not observed anywhere beyond the falls of Atures.

Eye dusky; bill and feet black.

THALURANIA TSCHUDII Gould.

Thalurania tschudii Gould, P. Z. S. 1860. p. 312; Berlepsch & Hartert, p. 86.

Common on the upper river at Munduapo and Nericagua. Not observed elsewhere.

THALURANIA REFULGENS Gould.

Thaluranía refulgens Gould, P. Z. S. 1852: p. 9; Stone, Proc. Ac. Nat. Sci. Phil. 1913: p. 201. (Manimo Riv., Isla de Morocatico).
Recorded by Stone from the delta country.

THALURANIA FURCATA FISSILIS Berlepsch & Hartert.

Thaluranía furcata fissilis Berlepsch & Hartert. Novit. Zool. IX. 1902. p. 87 (Type, Caura River, Suapure, Venezuela).

This species was described from specimens collected on the Caura River. It has not been observed on the Orinoco proper.

Recorded by Berlepsch and Hartert from "Parima Mountains" (Caura River region) collected by Klages. On my first expedition this species was not observed, but in 1905 and in 1907, it was noted as not uncommon about Caicara during the month of May.

Eye dark; bill black; feet dusky.

ANTHRACOTHORAX NIGRICOLLIS (Vieillot).

Trochilus nigricollis Vieill., Nouv. Dict. VII. p. 349.

Lampornis nigricollis Berlepsch & Hartert, p. 87.

Common from the mouth of the river Meta up as far as I extended my explorations.

ANTHRACOTHORAX GRAMINEUS (Gmelin).

Trochilus gramineus Gmelin, Syst. Nat., I: 1788: p. 488.

Anthracothorax gramineus Stone, Proc. Ac. Nat. Sci. Phil. 1913: p. 201 (Pedernales).

Recorded by Stone from the delta.

CHRY SOLAMPIS ELATUS (Linnaeus).

Trochilus mosquitus L., Syst. Nat. ed. 12. i 1766. p. 192.

Chrysolampis mosquitus Berlepsch & Hartert, p. 87.

Common along the middle stretches of the river from Ciudad Bolívar up as far as the mouth of the Meta. Recorded by Berlepsch and Hartert from Suapure, Temblador and La Prición, on the Caura River.

HELIOTHRYX AURITA (Gmelin).

Trochilus auritus Gm., Syst. Nat. I. 1788. p. 493.

Heliothrix aurita Berlepsch & Hartert, p. 88.

Rare. One specimen taken at Maipures. Berlepsch and Hartert record specimens collected by both Klages and André at points on the Caura River.

ANTHOSCENUS LONGIROSTRIS LONGIROSTRIS (Audeb & Vieillot).

Trochilus longirostris Aud. & Vieill., Ois. Dor. I. 1802. p. 128, Pl. 59.

Floricola longirostris Berlepsch & Hartert, p. 88.

Rare. One specimen taken at Maipures; also recorded by Berlepsch and Hartert from Suapure and La Pricion on the Caura River.

CALLIPHLOX AMETHYSTINA (Gmelin).

Trochilus amethystinus Gm., Syst. Nat. I. 1788. p. 496.

Calliphlox amethystina Berlepsch & Hartert, p. 88.

Not observed on my first expedition to the Orinoco, but not uncommon at Caicara, both in 1905 and 1907. The specimens secured were feeding about the flowers of low bushes just along a path at the edge of the dark forest.

Eye dusky; bill and feet blackish.

Recorded by Berlepsch and Hartert from Suapure on the Caura River.

CATHARMA ORTHURA (Lesson).

Ornismya orthura Lesson, Hist. Nat. Troch., p. 85, 88 t. 28, 29 (1832).

On my first expedition to the Orinoco this species was not observed, but in 1905, and in 1907, during May and June, it was not uncommon about Caicara. The females collected do not have the red apical spots on the throat feathers. On the other hand each feather of the throat has the tip green, similar in shade to the back, and narrowly edged with buff. The forward parts of the cheeks are white, and the dusky spots below the eye blend into the dusky greenish feathers of the lower throat forming an ill-defined band across the lower throat. The outer rectrices are tipped with cinnamon.

LOPHORNIS ORNATUS (Boddaert)

Trochilus ornatus Bodd., Tabl. Pl. Enl. 1783. p. 39.

Lophornis ornatus Berlepsch & Hartert, p. 88.

Not uncommon at Caicara. Three males and one female were taken during June, 1907. One only taken on my first expedition.

Eye dark seal; bill black; feet blackish.

POLEMISTRIA VERREAUXI KLAGESI (Berlepsch & Hartert).

Lophornis verreauxi klagesi Berlepsch & Hartert, Novit. Zool. X. 1902. p. 89 (Type, ex Suapure, Caura River, Venezuela).

Not observed on the Orinoco proper, but recorded by Berlepsch and Hartert from Suapure and from La Pricion on the Caura River.

DISCOSURA LONGICAUDA (Gmelin).

Trochilus longicaudus Gm., Syst. Nat. I. 1788, p. 468.

Discosura longicauda Berlepsch & Hartert, p. 89.

A single female was taken at Nericagua in April, 1899. Not observed elsewhere.

CAPRIMULGIDAE—GOATSUCKERS, NIGHTHAWKS AND WHIP-POOR-WILLS.

Five species are included in the Berlepsch and Hartert paper, each of which is abundant throughout the region.

THERMOCHALCIS¹ CAYENNENSIS INSULARIS (Richmond).

Caprimulgus cayennensis Gm., Syst. Nat. I. 1788. p. 1031.

Stenopsis cayennensis Berlepsch & Hartert, p. 89.

Stenopsis cayennensis insularis Richmond, Proc. Biol. Soc. Wash. XV: 1902: 159 (Curaçao).

S[tenopsis] c[ayennensis] insularis Ridgway, Birds N. & M. Am. VI: 1914: 501 (Rio Caura, Venez.).

Stenopsis cayennensis monticola Chapman, Bull. A. M. N. H. XXXIII: 1914: 173. (Maripa, Rio Caura, Ven.)

Common in the neighborhood of Altigracia, Caicara and Quiribana de Caicara. During the day time they frequent the thickets that border the heavily wooded areas, where they may be seen resting on the ground (usually) or on low horizontal branches.

A nest with two fresh eggs was found at Caicara, May 8, 1905. The nest was a slight hollow in the bare ground of an open field. The eggs are elliptical-ovate in form and measure 17.6 x 24.6 and 17.5 x 23.7

¹Richmond Proc. Biol. Soc. Wash. XXVIII: 1915: 180.

mm. They are a pale vinaceous buff, with two sets of markings, one superimposed above the other. The inner markings are a pale lavender greyish, the outer set ferruginous. In one of the eggs the markings are scattered over the entire surface and consist of irregular lines and dashes. In the other egg the markings are grouped chiefly about the larger end and consist of irregular dots, spots and blotches.

NYCTIDROMUS ALBICOLLIS ALBICOLLIS (Gmelin).

Caprimulgus albicollis Gm., Syst. Nat. I. 1788. p. 1030.

Nyctidromus albicollis Berlepsch & Hartert, p. 90.

Native name *Aguita Camino*. Common.

Eye seal brown; bill black; feet dusky.

These birds frequent the more thinly wooded districts or the edges of thick forest region during the daytime, resting on the ground among the fallen leaves, where their colors blend with that of the dead leaves. I have never observed this species perched anywhere except on the ground. At night they come out in the open savannas, and are frequently seen about the doorways of the houses as well as out in the country districts.

About Caicara fresh eggs are found from early in March until the end of May. There is no nest built and the two eggs are often deposited in the most open, and what would seem dangerous, situations, on the bare ground. Two eggs found on the 9th of March were near the edge of thick forest bordering the river and almost directly in a path much used by cattle, pigs, and other animals. The eggs lay on a spot of bare ground about 8 cm. in diameter surrounded on all sides by dead leaves. Incubation was far advanced and only one egg was preserved. It is a pale vinaceous buff in color marked all over with irregular spots and blotches of vinaceous brown; ovate in form and measures 28.5 x 21 mm.

The male parent bird and a set of two fresh eggs were collected May 5th. The bird, when flushed, feigned a broken wing to draw my attention from the eggs. One of these eggs is elliptical-ovate and the other between an elliptical-ovate and an ovate in shape. The markings are in two shades of color, those of a dark vinaceous overlying others of pale vinaceous brown. They measure 28.5 x 21.3 and 28.4 x 20.5 mm.

NYCTIPOLUS NIGRESCENS (Cab.).

Caprimulgus nigrescens Cabanis in Schomburgk Reisen. Brit. Guiana III: (1848): 710 (Brit. Guiana): Hellmayr, Novit. Zool. XVII: 1910: 381 (Caura, Venezuela).

Nyctipolus nigrescens Ridgway, Proc. Biol. Soc. Wash. XXV: 1912: p. 198.

There are three specimens in the American Museum collection from the Caura River; two from La Union and one from Suapure.

CHORDEILES ACUTIPENNIS ACUTIPENNIS (Boddaert).

Caprimulgus acutipennis Bodd., Tabl. Pl. Enl. 1783. p. 46.

Chordeiles acutipennis Berlepsch & Hartert, p. 90.

Not uncommon. Taken at Altagracia, Quiribana de Caicara and at Maipures.

A nest of this species was found at Raton Island about midway between Maipures and the mouth of the Vichada River. The nest, or better, nesting site, was a mere slight hollow near the centre of one of the enormous flat-topped granite boulders that are so common along the Orinoco. The colors of the sitting bird blended almost perfectly into the colors of the surroundings and I would not have discovered her had I not flushed her by almost putting my foot upon her. The color of the eggs was also decidedly protective. The eggs were taken February 1st and were entirely fresh. They are nearly elliptical-oval in form, being scarcely noticeably smaller at one end than at the other. The ground color is a pale vinaceous buff and over the entire surface are thickly scattered small, faint, ill-defined markings of greyish underlying others of pale raw umber. They measure 24.75×19.25 and 25×19.25 mm.

NANNOCHORDEILES PUSILLUS SEPTENTRIONALIS Hellm.

Chordeiles pusillus Gould, P. Z. S. 1861. p. 182.

Nannochordeiles pusillus Berlepsch & Hartert, p. 90.

N[annochordeiles] pusillus septentrionalis Hellm., Novit. Zool. XV: 1908: p. 78 (Type ex Maipures).

Observed at Maipures only, where two specimens were collected on my first expedition, one in December, the other in January.

NYCTIPROGNE LEUCOPYGIA (Spix).

Caprimulgus leucopygus Spix, Av. Bras. II. 1823. p. 3. Pl. 3.

Nyctiprogne leucopygia Berlepsch & Hartert, p. 90.

Eye blackish; feet dusky slate.

This species was in the Delta Region about Las Barrancas, also at Ciudad Bolivar and at Caicara. During the day time these birds conceal themselves in the dense thickets bordering ponds and streams, where they may be found perched on horizontal branches from 30 to 100 cm. from the ground. They perch crossways of the branch, and not infrequently I have seen from two to eight or ten huddled close beside one another all facing in the same direction.

PODAGER NACUNDA (Vieillot).

Caprimulgus nacunda Vieill., Nouv. Dict. x. p. 240 (1817).

Two taken at San Mateo de Caicara; male May 19th and female May 25th.

Eye dark; bill blackish; feet dusky grey.

On my previous visits to the Orinoco this species was observed on two occasions but no specimens were collected. It seems to keep entirely to the open savanna not even seeking the protection and concealment of thickets when at rest during the day.

In my rather long experience as a collector I have met with very few birds as difficult to make up into good skins as the present species.

MICROPODIDÆ—THE SWIFTS.

Only three species were included in the Berlepsch and Hartert paper, two of which number were collected on the Orinoco proper and the third recorded from Suapure on the Caura River. Additional collecting will almost certainly add to this number.

CLAUDIA SQUAMATA (Cassin).

Cypselus squamatus Cass., Proc. Acad. Nat. Sci. Phila. VI. 1853. p. 369.

Claudia squamata Berlepsch & Hartert, p. 91.

This species was abundant about Altagracia and at Caicara where they were frequently observed coursing over the savannas during the afternoon, when the sun was hottest. They were noted in parties of from twenty to fifty.

CHAETURA SPINICAUDA (Temminck).

Cypselus spinicaudus Temm., Tabl. Méth. in Pl. Col. I. 1839. p. 57.*Chaetura spinicauda* Berlepsch & Hartert, p. 91.

Not observed on the Orinoco by the writer, but recorded by Berlepsch and Hartert from Suapure on the Caura River.

CHAETURA ANDREI Berlepsch & Hartert.

Chaetura andrei Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 91 (Type, ♂, ex Caicara, Orinoco River, Venezuela. Cherrie Coll. No. 10534.)

I arrived at Altagracia the first of November, but no specimens of this swift were observed until the 2nd of February following; after that date they were seen but owing to their habit of flying high up, specimens were secured with the greatest difficulty. Noted as not uncommon at Caicara during March and April.

PICIDAE THE WOODPECKERS.

Berlepsch and Hartert's paper includes seventeen species, fifteen of which number were observed and collected by the writer on the Orinoco proper, the other two species included in that list came from points on the Caura River.

KEY TO GENERA, SPECIES AND SUBSPECIES OF PICIDAE.

- a. Tail-feathers stiff and pointed.
 - b. Middle of belly bright red or reddish.
 - c. Back barred black and white.
 - d. Rump and upper tail-coverts white, not barred. *Certhia abalana*.
 - d'. Rump and upper tail-coverts white, barred like back. *Colinus torquatus*.
 - c'. Back black, not barred.
 - d. With a white supercilary stripe and yellow nuchal band. *Trogon curvatus*.
 - d'. Without supercilary stripe or yellow nuchal band. *Trogon rubrocapillus*.
 - b'. Middle of belly not red or reddish.
 - c. Under-parts barred or spotted with black or blackish.
 - d. Chin, throat and sides of head yellow. (In males a short, red malar streak). *Chloronotus flavigula*.
 - d'. Chin, throat and sides of head not uniform yellow.
 - c'. Under-parts spotted with black. *Chrysomitris punctigula punctigula*.
- a'. Under-parts barred with black.
 - f. General color of upper-parts black.
 - g. Outer hind toe longer than outer front toe (centre of back largely white). *Scolecophagus maculatus*.
 - g'. Outer hind toe not longer than outer front toe (centre of back black and spiculated white). *Coccyzus erythrophthalmus*.
 - f'. General color of upper-parts olive or yellowish-green.
 - g. Wing-quills barred with buff or white on inner webs.
 - h. Wing-coverts with buff or white spots.
 - i. Upper back slightly tinged with reddish. *Amphispiza bilineata*.
 - i'. Back golden olive without reddish tinge. *Amphispiza bilineata*.
 - h'. Wing-coverts without spots but with yellowish shaft lines showing through the reddish tips (absent in some). *Amphispiza bilineata*.
 - g'. Wing-quills not barred on inner webs. *Chloronotus punctigula punctigula*.

¹Has been recorded from points in the state of Bermudez, Venezuela and from Brit. Guiana.

- c'*. Under-parts not barred or spotted with black.
i. Ventral color above and below yellowish buff.
d'. General color above not yellowish buff. *Cyanocorpha bicolor*.
e. Back black.
f. Basal half or more of primaries (except the two outermost) blackish brown.
f'. Outer webs of primaries black (or at least with broad black edges). *Sitta carolinensis*.
e'. Back chestnut brown.
f. General color of under parts brown, darker than back.
g. Crest dark chestnut, darker than back. *Celeus fumana*.
g'. Crest tawny or cinnamon brown. *Celeus elegans hellmayri*.
f'. Lower throat and breast black, remaining under parts dark buff. *Certhnopicus torquatus*.
a'. Tail-feathers soft (*Picumnus*).
b. Under-parts barred with black.
c. Feathers of crown tipped with red or yellow.
d. Feathers of crown tipped with red. *♂ Picumnus undulatus*.
d'. Feathers of crown tipped with yellow. *♂ Picumnus stellae*.
e'. Feathers of crown with white or pale yellowish tips. *♀ Picumnus stellae*.
b'. Under-parts not barred. *P. amma undulatus*.
Picumnus leucogaster.

CHLORONERPES FLAVIGULA (Boddaert).

Picus flavigula Bodd., Tabl. Pl. Enl. 1783. p. 49.

Chloronerpes flavigula Berlepsch & Hartert, p. 91.

Observed only in the heavily wooded region, beyond the falls of Atures. Miller and Iglseider collected a specimen at the Foot of Mount Duida (Am. Mus. Collection).

CHRYSOPTILUS PUNCTIGULA PUNCTIPECTUS Cabanis & Heine.

Chrysophilus punctipectus Cab. & Hein., Mus. Hein. IV. 1863. p. 163.

Chrysophilus punctigulus guttatus Berlepsch & Hartert, p. 92.

Common from Ciudad Bolivar to the mouth of the Apure. Found more commonly in the scattering clumps of trees on the savannas than in the heavy timber along the river.

Eye seal brown; bill blackish slate; feet olive green.

CENTURUS SUBELEGANS SUBELEGANS Bonaparte.

Centurus subelegans Bonaparte, P. Z. S. 1837: p. 106 ("Mexico"-Venezuela, see Bonaparte Consp. Av. i: 1850: 119).

Common at Ciudad Bolivar and at Caicara. Like the preceding species this is rarely met with in heavily wooded districts.

Eye mummy brown; bill black; feet dusky slate.

CENTURUS TERRICOLOR Berlepsch.

Centurus terricolor Berl., Ibis, 1880. p. 130.

Melanerpes terricolor Berlepsch & Hartert, p. 92.

Berlepsch and Hartert include all the specimens of *Centurus* that I sent to the Tring Museum as *terricolor*, but the specimens secured on

later expeditions have all been *subelegans*! None have been seen having the rump and upper tail-coverts barred—the distinguishing character of *terricolor*. I am inclined to agree with Richmond¹ that *terricolor* of Berlepsch is the same as *subelegans* of Bonaparte.

TRIPSURUS CRUENTATUS (Boddaert).

Picus cruentatus Bodd., Tabl. Pl. Enl. 1783. p. 43.

Melanerpes cruentatus Berlepsch & Hartert, p. 92.

Rare. Two collected at Munduapo in February (Berl. & Hart. l. c.).

Eye lemon yellow, eye-lids black, bare skin about eyes straw yellow; bill slate black; feet plumbeous pea green.

TRIPSURUS RUBRIFRONS (Spix).

Picus rubrifrons Spix, Av. Bras. I: (1824): p. 61 ("in sylvis Parae").

Melanerpes cruentatus Berl. & Hart., Novit. Zool. IX: 1902: 92 in part (Suapure).

T[ripsurus] rubrifrons Ridgway, Birds of N. & M. America VI: 1914: 118.

In the Berlepsch and Hartert paper, birds from Suapure (Caura River) are entered as *cruentatus*. There are, however, in the American Museum collections, six Caura River specimens (one male from Suapure and four females and one male from La Union) that are certainly *rubrifrons*. The Suapure male shows a distinct, although imperfect, postocular superciliary stripe; it is entirely absent in the four females and male from La Union: and none of the specimens show a trace of the conspicuous yellow nuchal band of *cruentatus*.

VENILIORNIS CASSINI (Malherbe).

Mesopicus cassini Malh., Picidae, II. 1862. p. 55. Pl. 68, figs. 2, 3.

Veniliornis cassini Berlepsch & Hartert, p. 93.

Not observed on the Orinoco proper but recorded by Berlepsch and Hartert from Suapure and from La Pricion on the Caura River.

VENILIORNIS ORENOCENSIS Berlepsch & Hartert.

Veniliornis orenocensis Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 93.

(Type, ex "regione fluminis Orinoco"); I would substitute Munduapo, Orinoco River.

¹U. S. N. M. XVIII: 1895: p. 667.

Although Berlepsch and Hartert give the habitat of this species as covering the region from Angostura (Ciudad Bolívar) to Munduapo, inclusive, it was not observed below the falls of Atures by the writer, its place being taken on the middle stretches of the river—between the mouth of the Meta River and Ciudad Bolívar—by the following species.

Eye vandyke brown; bill above black, below slate grey; feet olive plumbeous.

In the American Museum are two specimens from Boca de Sina, Cunucunuma River, Upper Orinoco.

VENILIORNIS PASSERINUS (Linnaeus).

Picus passerinus L., Syst. Nat. ed. 12. I. 1766. p. 174.

Veniliornis passerinus Berlepsch & Hartert, p. 93 (in part).

Common from Ciudad Bolívar to Caicara and beyond as far as the mouth of the Meta.

Eye dark sepia brown; bill black; feet plumbeous olive.

CELEUS ELEGANS HELLMAYRI Berlepsch.

Celeus elegans hellmayri Berlepsch, Novit. Zool. XV: 1908: 272 (Brit. Guiana; Venezuela).

Celeus elegans reichenbachii Hellmayr, Novit. Zool. XIII: 1900: p. 40 (Guanoco, Orinoco Delta, Venezuela).

There is a specimen, an adult female, in the American Museum collection, that was taken by Klages at La Union, Caura River, Oct. 7, 1901.

The absence of pale shaft-streaks or spots on the feathers of the back and upper wing-coverts (as pointed out by Hellmayr) serves to distinguish this race from *elegans elegans* and *elegans leotaudi*.

CELEUS JUMANA (Spix).

Picus jumana Spix, Av. Bras. I. 1824. p. 57. Pl. 47, figs. 1 ♂, 2 ♀.

Celeus jumana Berlepsch & Hartert, p. 94.

Common on the upper river from Perico onwards, as far as I collected.

CELEUS GRAMMICUS (Malherbe).

Picus grammicus Malh., Mem. Soc. Roy. Liège, 1845. p. 69.

Celeus grammicus Berlepsch & Hartert, p. 94.

Not common. Taken only at Munduapo and Nericagua.

CERCHNEIPICUS TORQUATUS (Boddaert).

Picus torquatus Bodd., Tabl. Pl. Enl. 1783. p. 52.

Cerchneipicus torquatus Berlepsch & Hartert, p. 94.

Not observed by the writer. Recorded by Berlepsch and Hartert from Suapure and from La Pricion on the Caura River, and there are two specimens from La Union in the American Museum collection.

CROCOMORPHUS FLAVUS (Müll.).

Picus flavus Müll., Syst. Nat. Supplement, 1776. p. 91.

Crocomorphus flavus Berlepsch & Hartert, p. 94.

Not observed below Altagracia but collected there, at Caicara, and up as far as the falls of Maipures.

Eye carmine red; bill chrome yellow shading into sulphur yellow at the base of the mandible; feet dark pea green.

This species I did not see in the sparsely wooded savanna districts. It kept to the heavier forests along the Orinoco. The call notes of this woodpecker are somewhat like those of our Great-crested Flycatcher—not what one expects from a woodpecker. They are usually seen in pairs or family parties of two adults and three or four immature birds. Specimens that I have collected have had the feet invariably covered with a mass of small black ants (dead) held by some sticky substance, and the birds themselves have a strong odor of formic acid.

SCAPANEUS RUBRICOLLIS (Boddaert).

Picus rubricollis Bodd., Tabl. Pl. Enl. 1783. p. 37.

Campephilus rubricollis Berlepsch & Hartert, p. 95.

Rare, seen only in the heavily wooded region above the falls. Two specimens were collected at Munduapo.

Eye light lemon yellow; bill pale horn color, ridge of culmen dusky and base of mandible shaded with greenish; feet dark sage green.

SCAPANEUS MELANOLEUCOS (Gmelin).

Picus melanoleucos Gm., Syst. Nat. I. 1788. p. 462.

Campephilus melanoleucos Berlepsch & Hartert, p. 95.

Native name *Carpintero Soldado*. Not rare, but very wary and somewhat difficult to collect. Keeps to heavily timbered districts. Noted and specimens collected at Ciudad Bolivar, but rarely below the mouth of the Apure. Seen on the upper river as far as I extended my explorations.

CEOPHLOEUS LINEATUS (Linnaeus).

Picus lineatus L., Syst. Nat. ed. 12, 1766. p. 174.

Ceophlocus lineatus Berlepsch & Hartert, p. 95.

This, like the preceding species, is known as *Carpintero Soldado*. Not uncommon on the middle Orinoco from some distance below Ciudad Bolivar to the falls of Atures.

Eye straw yellow; bill dusky slate above, whitish below; feet plumbeous.

PICUMNUS LEUCOGASTER Pelzel.

Picumnus leucogaster Pelz., Orn. Bras. 1869. pp. 241, 335; Berlepsch & Hartert, p. 95.

Not common. This is the only species of *Picumnus* seen on the middle Orinoco. Specimens were collected at Altagracia and Caicara.

PICUMNUS UNDULATUS Hargitt.

Picumnus undulatus Hargitt, Ibis 1889. p. 354; Berlepsch & Hartert, p. 95.

Rare on the Orinoco where two specimens only were collected by the writer on the upper river, one at Perico in September and the other at Nericagua in March.

Not uncommon on the Caura River, as Berlepsch and Hartert record specimens from La Union, Suapure, La Pricion and Nicare.

PICUMNUS STELLAE¹ Berlepsch & Hartert.

Picumnus stellae Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 96 (Type, ♀ ex Maipures, Orinoco River).

This was the common form of *Picumnus* on the upper river. It was not observed below the falls of Atures.

Eye seal brown; bill black, basal half of mandible slate grey; feet plumbeous.

CUCULIDAE—THE CUCKOOS.

Berlepsch and Hartert include ten species in their list. Nine of the ten were collected on the Orinoco proper by the writer, and one (*Piaya melanogastra*), noted only from its tributary, the Caura River.

¹This species was named after Mrs. Cherrie, who accompanied me on the first Orinoco expedition, and in the last days of our journey, as a token of my appreciation, named the former in her honor and the latter in her memory.

I am now able to add to the list *C. euleri*—very distinct from *C. americanus*, but sometimes confused with that species.

The species of *Piaya* and of *Crotophaga* and *Tapera naevia* are, I believe, resident in all localities where found, while the species of *Coccyzus* are transient, or at best, not permanent residents in the Orinoco region and are known collectively as *Crecienteros*, a vernacular name alluding to the fact that they appear at the season of the annual rise of the Orinoco.

KEY TO THE GENERA, SPECIES AND SUBSPECIES OF CUCULIDÆ.

- a. Maxilla very deep, much compressed; general color of plumage above and below black.
 - b. Sides of maxilla smooth with neither longitudinal grooves nor ridges. *Crotophaga ani.*
 - b'. Sides of maxilla ridged or grooved longitudinally.
 - c. Larger, wing more than 17 cm.; upper parts of body glossed with iridescent steel blue. *Crotophaga major.*
 - c'. Smaller, wing less than 17 cm.; body glossed with iridescent purplish. *Crotophaga sulcirostris.*
- a'. Maxilla not abnormally deep and compressed, and general color of plumage not black.
 - b. General color of upper-parts red-brown.
 - c. Top of head grey, in sharp contrast with red-brown back. *Piaya melanogastra.*
 - c'. Head not grey, nearly uniform with back.
 - d. Smaller, total length less than 30 cm. *Piaya rutilla orinocensis.*
 - d'. Larger, total length more than 30 cm.
 - e. Outer webs of second and third pairs of rectrices largely rufous (except for the blackish subapical band, about 25 mm. in width). *Piaya ayana ayana.*
 - e'. Outer webs of second and third pairs of rectrices not rufous.
 - f. Tail-feathers underneath nearly uniform blackish, with little or no trace of rusty shading, and blackish subterminal band almost obsolete. *Piaya cayana cayana.*
 - f'. Tail underneath blackish but with a distinct rusty shading, and narrow subapical band about 10 mm. in width. *Piaya cayana columbiana.*
 - b'. General color of upper-parts not red-brown.
 - c. Very large tail more than 200 mm., none of the rectrices white tipped.
 - d. Chin and upper throat dusky brownish, merging into black on lower throat; breast and belly dusky mouse-gray. *Neomorphus nigrogularis.*
 - d'. Chin and upper throat smoke-gray, followed by a band across the lower throat and neck where the feathers have black tips (narrow anteriorly but occupying half or more of feather posteriorly); breast and belly drab gray; under tail-coverts dusky brown. *Neomorphus rufipennis.*
 - c'. Smaller, tail less than 20 cm.; rectrices (except intermediæ) white tipped.
 - d. Crested; upper-parts more or less streaked with blackish. *Tapera naevia.*
 - d'. Not crested, and upper-parts not streaked.
 - e. Chin and throat hazel brown, in sharp contrast with remaining lower parts. *Micrococcyx punilus.*
 - e'. Color of chin and throat not in sharp contrast with remaining lower parts.
 - f. Mandible black; lower parts strongly suffused with buff. *Coccyzus melacoryphus.*
 - f'. Mandible yellowish or orange with blackish tip; under parts not strongly buff.
 - g. Much rufous on both outer and inner webs of inner primaries. *Coccyzus americanus.*
 - g'. Without rufous on wing quills. *Coccyzus euleri.*

COCYZUS AMERICANUS (Linnaeus).

Cuculus americanus L., Syst. Nat. ed. 10, 1758, p. 111.

Coccyzus americanus Berlepsch & Hartert, p. 96.

Two of the cuckoos sent to the Tring Museum were identified by Messrs. Berlepsch and Hartert, as *C. americanus*; one, a female, was

collected at Altigracia in November, and a male was taken at Nericagua, on the upper river, in April.

COCCYZUS EULERI Cabanis.

Coccyzus euleri Cabanis, Journ. f. Orn. 1873. p. 73. (ex Cantagallo).

Two specimens were taken, both females, that differed slightly in the colors of the bill, eye-lids, etc. The first, collected at Ciudad Bolivar, April 15, 1905 (No. 13443 Geo. K. Cherrie Coll.) had the eye seal brown, eye-lids lemon yellow; bill above black with basal cutting edges olive yellow, mandible chrome yellow with blackish tip; feet dusky slate grey.

The second collected at Caicara, June 10, 1905 (No. 13856 Geo. K. Cherrie Coll.) had the eye seal brown, eye-lids blackish; maxilla, and extreme tip of mandible black, with basal cutting edges of maxilla, to a line bordering the lower edge of the nostrils and extending nearly one-half way to the tip, and mandible orange-buff; feet dusky slate grey.

The ovaries of the latter bird were much enlarged, indicating the near approach of the breeding season. My attention was drawn to this bird by hearing the familiar "rain crow's" note. It is in what I believe to be full nuptial plumage—a delicate pearl grey on breast, sides and flanks, shading to an almost silvery white on the belly.

C. euleri is at once distinguished from *C. americanus* by the entire absence of rufous on both the outer and inner webs of the wing quills and the darker general color above. This species has not been previously recorded from Venezuela.

COCCYZUS MELACORYPHUS Vieillot.

Coccyzus melacoryphus Vieill., Nouv. Dict. VIII. 1817. p. 271; Berlepsch & Hartert, p. 97.

On my first expedition this species was observed only once, a single specimen having been collected at Quiribana de Caicara April 28, 1898. It was not seen in 1905, but in 1907 two were collected at Caicara in June; and at Las Barrancas (in the Delta region) it was common during July.

One of the specimens collected at Las Barrancas seems somewhat abnormally colored, or may possibly represent another race. Below, it is exactly similar to typical examples of *C. melacoryphus*; above, the back is also similar, but the wings are decidedly different, the quills being dull rufous brownish on both webs, except the tips

which are dusky. The primary-coverts are also strongly dull rufous brownish as are also the outer webs and tips of the greater wing-coverts. The pattern of coloration is similar to that of the wings of the yellow-billed cuckoo (*C. americanus*). It is possible this rufous shading is characteristic of immature birds.

MICROCOCYX PUMILUS (Strickland).

Coccyzus pumilus Strickl., Contrib. Orn. 1852. p. 28. Pl. 82; Berlepsch & Hartert, p. 97.

In the American Museum collection is a specimen collected by Klages at Maripa on the Caura. The forehead, crown and occiput are gull gray; the mantle and lower back mouse gray; the two colors blending insensibly into one another at the base of the occiput. The wings and tail are browner; the primaries blackish, especially toward the tip; the ends of the rectrices are black, narrowly tipped with white; sides of head, chin and throat hazel brown; breast and belly pale buffy; flanks, thighs and under wing- and tail-coverts buff; under surface of tail gray, the inner webs of the rectrices buff basally. Wing 103; tail 105; bill 17 mm.

Rare. An adult male was taken, on my first expedition, at Quiribana de Caicara, April 29, 1905, and a second adult male at Caicara, May 2, 1905.

Eye carmine, eye-lids carmine; bill black; feet slate gray.

PIAYA MELANOGASTRA (Vieillot).

Cuculus melanogaster Vieill., Nouv. Dict. VIII. 1817. p. 236.

Piaya melanogastra Berlepsch & Hartert, p. 97.

Not observed by the writer on the Orinoco proper, but included in Berlepsch and Hartert's list based on a single specimen collected by Klages at Suapure on the Caura River. There is now a specimen in the American Museum collection taken at the foot of Mt. Duida.

PIAYA CAYANA CAYANA Linnaeus.

Cuculus cayanus L., Syst. Nat. ed. 12. 1766. p. 170.

Piaya cayana guianensis Berlepsch, Ibis. 1884. p. 435. (Angostura); Berlepsch & Hartert, p. 97, part (Suapure and La Pricion, Caura River, Venez.); Hellmayr, Novit. Zool. XIII. 1906. p. 43.

Piaya cayana cayana Hellmayr, Novit. Zool. XIV. 1907. p. 35; Stone, Proc. Phila. Acad. Sci. LX. 1908. pp. 497-8 (Suapure).

A study of the specimens in this museum from the Orinoco

region, together with those in the collection of the American Museum, convinces me that there are only two ways in which they can be treated logically. Either all must be lumped together under a single name (possibly *P. c. columbiana*); or, three or four distinct races must be recognized as inhabiting that region.

I have adopted the latter course—my conclusions, therefore, being quite at variance with those of the two authors¹ who have most recently studied the *P. cayana* group.

The native name of the birds of this group is *Piscua*. They frequent the less heavily wooded districts.

Birds from the Caura River (American Museum collection), a single example from the San Feliz River near its junction with the Cuchivero River, and British Guiana specimens are readily separable from the middle Orinoco birds by the darker ash grey of the breast and more sooty blackish or greyish of the under tail-coverts. Also the tail-feathers underneath are uniformly blackish with little or no trace of rusty shading, and the subterminal bar practically obsolete. Above, these birds are uniformly darker, more inclined to bay—with less ferruginous.

PIAYA CAYANA COLUMBIANA (Cabanis).

Pyrhcorax columbianus Cabanis, Journ. f. Orn. 1862. p. 70 (Cartagena).

Piaya cayana guianensis Berlepsch & Hartert, p. 97, part. (Points on the Orinoco; Altigracia, Caicara, Ciudad Bolivar); Hellmayr, *ib.* XIII. 1907. p. 44. (Orinoco points.)

Piaya cayana cayana Hellmayr, Novit. Zool. XIV. 1907. p. 35 (Orinoco valley).

The birds from the middle Orinoco region—from Ciudad Bolivar (where *P. c. cayana* is also found) up at least as far as the mouth of the Meta River—seem to me referable to this race.

While closely related to typical *cayana*, they average much lighter in color, as pointed out in my remarks under that race; and the rusty shading of the under side of the tail-feathers seems to afford a ready means of separating the two races.

Eye dark lake red, bare skin about eye carmine; bill citron yellow distally shading to an apple green at base; feet plumbeous.

¹Hellmayr, Novit. Zool. XIV. 1906 pp. 33-1, *ib.* XIV. 1907. 35. Stone <A Review of the Genus *Piaya* Lesson> Proc. Phila. Acad. Sci. LX. 1908 (published January, 1909). pp. 192-301.

The specimens in the American Museum collection from Boca de Sina, Cunucunuma River (Upper Orinoco) differ from examples from the middle Orinoco in the almost total absence of the rusty shading of the under side of the tail-feathers, as in *c. cayana*, but their much darker, more intense bay (with a distinct purplish sheen in certain lights) rather than chestnut seems to separate them from that race. It is possible these birds are representatives of the race (*c. venezuelensis*) described by Cory (Orn. Series Field Mus. Pub. 1; May, 1913; p. 284). I feel that a series from the Upper Orinoco would show the birds from that region to be a distinct race.

PIAYA CAYANA INSULANA Hellmayr.

Piaya cayana insulana Hellmayr, Novit. Zool. XIII. 1906. p. 43 (Type, ex Chaguaramas, Trinidad).

Hitherto this race has been known from Trinidad only, but specimens collected at Las Barrancas (delta region) and compared with Trinidad examples show them to be identical.

Birds of this race are closely related to those from the middle Orinoco, but are brighter and lighter cinnamon-rufous, or ferruginous above (very much paler than Guiana birds); and as pointed out by their describer, they have the outer webs of the second and third rectrix entirely rufous, except for the blackish subapical band. The sub-terminal black bars on the rectrices are broader and more sharply defined than in Guiana or Orinoco birds, averaging 25 mm. while in the birds of the middle Orinoco the average does not exceed 10 mm.

A pair were observed carrying nesting material August 1st.

PIAYA RUTILA ORINOCENSIS Cherrie.

Piaya rutila orinocensis Cherrie, Bul. Am. Mus. Nat. Hist. XXXV, 1916. p. 393.

Piaya rutila Berlepsch & Hartert, p. 97.

Not common, but noted at Las Barrancas (Delta region), Ciudad Bolivar, Altagracia and up as far as Maipures.

Eye vermillion red; bill sulphur yellow; feet dusky plumbeous olive.

TAPERA NAEVIA (Linnaeus).

Cuculus naevius L., Syst. Nat. ed. 12. 1776. p. 170.

Diplopterus naevius Berlepsch & Hartert, p. 98.

Not common. Native name *Pavita*. While nowhere common

this species was observed everywhere from Las Barrancas and Ciudad Bolivar as far as I worked on the upper river.

Adult female, eye clay color; bill, ridge of culmen clove brown, cutting edge of maxilla cinnamon brown, mandible brown.

NEOMORPHUS RUFIPENNIS (Gray).

Cultrides rufipennis Gray, P. Z. S. 1849: p. 63. pl. 10 (Guiana).

Two specimens from the Caura River are in the American Museum Collection.

NEOMORPHUS NIGROGULARIS Chapman.

Neomorphus nigrogularis Chapman, Bull. Am. Nat. Hist. XXXIII: 1914: p. 194 (Foot of Mt. Duida, Venezuela).

Type in the collection of the American Museum.

CROTOPHAGA ANI Linnaeus.

Crotophaga ani L., Syst. Nat. ed. 10. 1758. p. 105; Berlepsch, Ibis, 1884. p. 435 (Angostura); Berlepsch & Hartert, p. 98.

Native name *Tio Louis*. Common along the middle stretches of the river from Ciudad Bolivar and Caicara beyond the falls of Maipures as far as I extended my explorations.

Eye seal brown; bill and feet black.

CROTOPHAGA SULCIROSTRIS Swainson.

Crotophaga sulcirostris Swainson, Philos. Mag. New & Unit. Ser. I: (1827): 440 (Mexico); Berlepsch & Hartert, p. 98.

The three species of *Crotophaga* seem to be found throughout the Orinoco region. Of the two smaller forms *C. ani* is the more abundant. I did not observe *sulcirostris* above the falls, but Miller collected a specimen for the American Museum at Maipures.

CROTOPHAGA MAJOR Gmelin.

Crotophaga major Gm., Syst. Nat. ed. 10. 1788. p. 363; Berlepsch & Hartert, p. 98.

Native name *Hervidor Oriquelo*. Not observed below Ciudad Bolivar, but noted at almost all points visited beyond. This species frequents the tangled thickets and densely wooded areas that cover or border swamps, ponds or water courses. Like other members of the genus they are social, going about in small flocks of from six or eight to twenty or thirty.

The native name *Hervidor* is derived from the Spanish verb *hervir*—to boil—doubtless in allusion to the peculiar vocal performance which certainly is much like the sound of bubbling, boiling water.

These cuckoos are occasionally seen in a state of semi-domestication about the native houses.

CAPITONIDAE—THE BARBETS OR THICKHEADS.

Two races of a single species are known from the Orinoco region.

CAPITO AURATUS INTERMEDIUS Berlepsch & Hartert.

Capito auratus intermedius Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 98. (*Type*, ex Nericagua, upper Orinoco, Venez.).

Only two specimens, a male and a female, were collected on my first expedition, at Nericagua, on the upper Orinoco.

There is a series in the American Museum collection from Boca de Sina, Cunucunuma River (upper Orinoco), that doubtless should be referred to this race. They show, however, a considerable orange wash on the lower breast and abdomen, a character supposed to be distinctive of *a. aurantiicinctus*, and are scarcely to be distinguished from a couple of Caura River specimens. I am consequently doubtful if *intermedius* is a valid race.

CAPITO AURATUS AURANTICINCTUS Dalmas.

Capito aurantiicinctus Dalmas, Bull. Soc. Zool. France. 1900. p. 178 ("Dans le bassin de la rivière Caura").

Capito auratus aurantiicinctus Berlepsch & Hartert, p. 99.

In the Am. Museum collection are two specimens from La Union (Caura River). One shows a considerable amount of the orange color on the middle of the breast that is supposed to be distinctive of the race.

First described and recorded from the Caura River by Dalmas. Berlepsch and Hartert record a specimen collected by André at Nicare on the same river.

RAMPHASTIDAE—THE TOUCANS.

Nine species are embraced in the Berlepsch and Hartert paper, but only five were collected by the writer on the Orinoco proper, the remaining four having been collected by either Klages or André at points on the Caura River. None were seen until I arrived in the heavily forested regions beyond the falls of Maipures.

The name *Piapoco* is applied to the toucans of the region collectively.

KEY TO THE GENERA, SPECIES AND SUBSPECIES OF RHAMPHASTIDAE.

- a. Nostrils opening behind the casque (*Ramphastos*)
- b. Upper tail-coverts lemon yellow, general color of bill reddish *Ramphastos monilis*.
- b'. Upper tail-coverts red (scarlet) or orange or in combination; general color of bill blackish.
- c. Upper tail-coverts uniform scarlet *Ramphastos vitellinus*.
- c'. Upper tail-coverts not uniform scarlet.
- d. Throat white, blending into yellow, varying in shade from lemon to orange, followed by a scarlet band, the scarlet extending centrally back onto the breast *Ramphastos osculans*.
- d'. Throat and neck white or white with lemon yellow tinge on neck.
- e. Smaller, bill less than 17 cm. Throat only slightly if at all tinged with lemon yellow *Ramphastos culminatus*.
- e'. Larger, bill more than 17 cm. Throat strongly tinged with lemon yellow *Ramphastos cuvieri inca*.
- a'. Nostrils rounded, opening upward at the edge of the casque. The culminal ridge extending back beyond the nostrils (*Pteroglossus*.)
- b. No band across the breast (sexes different). *Pteroglossus viridis*.
- b'. Breast banded (sexes alike).
- c. Throat chestnut *Pteroglossus flaviventris*.
- c'. Throat black.
- W. T. A. P. *Pteroglossus aracari*.
- d'. A single scarlet band across lower breast; maxilla with a broad black culminal stripe (at base occupying entire space between nostrils); thighs reddish green. *Pteroglossus aracari roraimae*

RAMPHASTOS CUVIERI INCA Gould.

Ramphastos inca Gould, P. Z. S. 1846. p. 68.

Ramphastos cuvieri inca Berlepsch & Hartert, p. 99.

One specimen secured at Munduapo on the first expedition and recorded by Berlepsch and Hartert.

RAMPHASTOS MONILIS MÜLLER.

Ramphastos monilis P. L. S. Müller, Natursyst. Suppl. (1776): p. 83 (Cayenne).

Ramphastos haematorhynchus Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 99. (Type, ex La Pricion, Caura River, Venez.).

Recorded by Berlepsch & Hartert from points on the Caura River only. Not seen on the Orinoco.

RAMPHASTOS OSCULANS Gould.

Ramphastos osculans Gould, P. Z. S. 1835. p. 156; Berlepsch & Hartert, p. 100.

Only one specimen collected, taken at Munduapo February 10, 1899, not seen on subsequent expeditions.

Eye seal brown, bare skin about eye turquoise blue; bill, with a narrow band at the extreme base deep black; culmen and tips of maxilla and mandible and the upper third of a sub-basal band sulphur yellow, lower two-thirds of sub-basal band azure blue, body of both maxilla and mandible black; feet glaucous blue.

RAMPHASTOS VITELLINUS Lichtenstein.

Ramphastos vitellinus Licht., Doubl. Verz. 1823. p. 7; Berlepsch & Hartert, p. 101.

Not taken by the writer, but recorded from Suapure, La Pricion on the Caura River by Berlepsch and Hartert.

RAMPHASTOS CULMINATUS Gould.

Ramphastos culminatus Gould, P. Z. S. 1833. p. 70; Berlepsch & Hartert, p. 101.

More often seen than either *cuvieri inca* or *osculans*. Five specimens were collected on my first expedition at Munduapo and at Nericagua.

The iris is bicolored, having an inner ring of seal brown and an outer zone of greenish grey; bare skin about eye turquoise blue; bill with a narrow band at the extreme base deep black, succeeded by a much broader band, which on the mandible and one-fourth of the maxilla is azure blue, the remainder, as also the culmen and tips of both maxilla and mandible, is sulphur yellow, body of the bill, maxilla and mandible black; feet glaucous blue.

PTEROGLOSSUS PLURICINCTUS Gould.

Pteroglossus pluricinctus Gould, P. Z. S. 1835. p. 157; Berlepsch & Hartert, p. 101.

Four specimens taken at Munduapo during February. Eye straw yellow, bare skin about eye paris green; bill with a narrow band at the extreme base of maxilla and mandible ochre yellow, remainder of mandible black, maxilla with a basal band, including a long acute triangular area along its basal cutting edge and the culmen black, tip pinkish vinaceous, body of the maxilla bicolor, the basal part being ochre yellow, the anterior part a soiled yellowish white, the two shades blending gradually into one another in the centre; feet dusky oil green, bare skin on sides of tarsi plumbeous.

PTEROGLOSSUS FLAVIROSTRIS FLAVIROSTRIS Fraser.

Pteroglossus flavirostris Fraser, P. Z. S. 1840. p. 61; Berlepsch & Hartert, p. 101.

Probably the most common of the species of toucan seen on the Orinoco.

Bare skin about the eye, on side of face, bicolored, a band immediately surrounding the eye slate black and the remaining outer portion dark maroon purple; bill, maxilla very pale primrose yellow with a series of black spots along the cutting edges of the basal part, together with a small elongated black patch also on the cutting edge near the tip, mandible very pale primrose yellow with an elongated ochraceous patch near the centre of the cutting edge; feet dark sage green.

PTEROGLOSSUS VIRIDIS (Linnaeus).

Ramphastos viridis L., Syst. Nat. ed. 12. 1766. p. 150.

Pteroglossus viridis Berlepsch & Hartert, p. 101.

Not noted on the Orinoco. Recorded by Berlepsch and Hartert from Suapure and from La Union on the Caura River.

PTEROGLOSSUS ARACARI RORAIMAE Bradbourne & Chubb.

Pteroglossus aracari atricollis Berlepsch & Hartert, p. 102.

Pteroglossus roraimae Bradbourne and Chubb, Ann. & Mag. Nat. Hist.

1912: p. 261 (Guiana, Roraima); Stone, Proc. Ac. Nat. Sci. Phil.

1913: p. 199 (Guinipa River: Rio Vagre).

Not observed on the Orinoco. Berlepsch and Hartert record only a single specimen collected by Klages at Suapure. Stone records it as abundant on the Guinipa and Vagre Rivers.

There is a specimen of *Pteroglossus* in the Am. Museum collection, from Sacupano, Orinoco Delta, that differs from examples from Cristobal Colon (Paria Peninsula), in that the thighs and under tail coverts are largely dusky greenish without reddish wash, whereas in typical *roraimae* those parts are lighter, more dusky sulphur yellowish with a reddish wash.

BUCCONIDAE —THE PUFF-BIRDS.

Six of the seven species included in Berlepsch and Hartert's paper were collected on the Orinoco proper.

KEY TO GENERA, SPECIES AND SUBSPECIES OF BUCCONIDAE.

- a. One or more black bands across the breast.
 - b. Two distinct black bands across the breast. *Hypnelus bicinctus*.
 - b'. One distinct black band across the breast.
 - c. Head and back without transverse blackish bars.
 - d. Middle of belly white, unmarked.
 - e. No white collar on hindneck. *Notharchus tectus tectus*.
 - e'. A broad white collar on hindneck. *Notharchus hyperhynchus dy-*
SODD.
 - d'. Middle of belly and breast buffy, thickly barred with narrow blackish lines. *Argicus macrodactylus chap-*
MANI.

- c'*. Head and back thickly barred with black lines. *Bucco capensis*.
a'. Without black bands across breast although the throat and breast may be blackish.
b. Throat chestnut or hazel brown.
c. Feathers of breast and sides with broad terminal black spots or bands. *Nyctaltes tamatia tamatia*.
c'. Feathers of breast and sides without terminal black spots or bands. *Nonnula dussumieri*.
b'. Throat slate gray or black.
c. Bill black; rump white *Chelidoptera tenebrosa*.
c'. Bill red; rump slate gray like back *Monasa nigra*.

BUCCO CAPENSIS Linnaeus.

Bucco capensis L., Syst. Nat. ed. 12. 1766. p. 168; Berlepsch & Hartert, p. 102.

This species was met with on my first expedition, only a single specimen, an adult female collected at the Mataben Rapids,¹ February 2, 1896.

NOTHARCHIUS HYPERRHYNCHUS DYSONI (Sclater).

Bucco dysoni Sclater, P. Z. S. 1885: p. 193 (Honduras); Stone, Proc. Ac. Nat. Sci. Phil. 1913: p. 199 (Manimo River).

Notharchus hyperrhynchus dysoni Ridgway, Birds N. & M. Am. VI: 1911: 376.

Stone records this species from the delta region.

NOTHARCHUS TECTUS TECTUS (Boddaert).

Bucco tectus Bodd., Tabl. Pl. Enl. 1783. p. 43; Berlepsch & Hartert, p. 102.

B[ucco] t[ectus] tectus Hellm., P. Z. S. Part IV. 1911, 1195 (Caura River).

Not observed on the Orinoco. Berlepsch and Hartert record specimens collected by Klages at Suapure and at La Pricion on the Caura River.

ARGICUS MACRODACTYLUS CAURENSIS Cherrie.

Argicus macrodactylus caurensis Cherrie, Bul. Am. Mus. Nat. Hist., XXXV. 1916, p. 389.

Bucco macrodactylus Berlepsch & Hartert, p. 102.

Rare. One taken, an adult male, at Maipures, December 21, 1898. The eye is liver brown; bill black; feet smoke grey.

NYSTACTES TAMATIA TAMATIA (Gmelin).

Bucco tamatia Gm., Syst. Nat. I. 1788. p. 405; Berlepsch & Hartert, p. 102.

¹The Mataben Rapids are above the falls of Maipures, between that point and the mouth of the Aichudi River.

Bucco tamatia tamatia Hellmayr, Novit. Zool. XVII: 1910; 391 (Maipures).

Rare; two were taken at Maipures, one in December and one in January. The American Museum has an example collected at the same place in April.

Eye walnut brown; bill black; feet olive plumbeous.

HYPNELUS BICINCTUS (Gould).

Tamatia bicinctus Gould, P. Z. S. 1836. p. 80.

Bucco bicinctus Berlepsch, Ibis, 1884. p. 435 (Angostura); Berlepsch & Hartert, p. 102.

Adult male: eye straw yellow; bill black; feet plumbeous olive.

Common. Found most commonly in the thinly wooded savanna regions.

The nesting habits of this species are somewhat extraordinary. The nest is excavated by the parent bird, in one of the large nests of the common termite (the white ant of the region) which form so conspicuous an object in many of the forest trees. The entrance is usually placed at about the middle on one side of the termite nest; the excavation then passes backward and upward for nearly the entire diameter of the termite dwelling, and is terminated with a slightly enlarged spherical chamber about 15 cm. in diameter. The entrance tunnel is about 8 cm. in diameter. No nesting material is carried in and the eggs are deposited on the debris at the bottom of the nest cavity.

A nest found at Caicara May 6th contained a single fresh egg. The parent bird remained in the nest cavity until I had cut and hacked at the termite nest (which by the way is exceedingly tough and hard) for some time. She must have been covered with the termites for they swarmed out everywhere over the nest in countless numbers, and the question uppermost in my mind was: How were the birds able to make their excavation in the face of the hoards of creeping biting termites? The egg is white, slightly glossy, short ovate in shape, and measures 24.6 x 20 mm.

In the American Museum collection are three examples from Maripa on the Caura River.

NONNULA DUIDAE Chapman.

Nonnula duidae Chapman, Bull. Am. Mus. Nat. Hist. XXXIII: 1914: 195 (Foot Mt. Duida, Venez.).

The type is in the collection of the American Museum.

MONASA NIGRA (Müller).

Cuculus niger Müll., Syst. Nat. Supplement, 1776. p. 90.

Monasa nigra Berlepsch & Hartert, p. 103.

Native name *Pico de Lacre*. Not observed on the lower Orinoco, but common from near the mouth of the Meta and beyond. Also common on the San Feliz River, near its junction with the Cuchivero River and recorded by Berlepsch and Hartert from points on the Caura River.

In fresh birds the eye is bay brown; bill poppy red; feet slate grey.

Birds of this species will frequently sit on low branches five or six feet from the ground, stupidly watching one until they can be almost taken in the hand. They were only observed in heavily timbered districts.

A female shot at Nericagua March 27th had an egg in the oviduct that would soon have been deposited. It was pure white in color.

A nest, with young nearly able to shift for themselves, was found at La Cascabel on the San Feliz River, near its union with the Cuchivero River, on the 27th day of May, 1907. The nest proper was at the bottom of an excavation 1.5 m. in depth. It was situated in a belt of heavy timber, on level ground, bordering the San Feliz River. The excavation (whether made by the puff-bird, or not, I am unable to say)¹ descended at an angle of about 45° from the horizontal and was about 7.6 cm. in diameter.

Over the entrance had been heaped a pile of rotten coarse dead twigs, as large as a half bushel measure, and having a rounded tunnel running along the ground from one edge to the entrance of the ground excavation. This pile of sticks forming a barrier to the real nest entrance was unquestionably of recent construction.

The nest was discovered by hearing the cries of the young issuing from what seemed only a pile of brush.

Birds in juvenal plumage resemble the adults except that the white patch on the bend of the wing is lacking, and the bill is a dusky dirty white.

CHELIDOPTERA TENEBROSA TENEBROSA (Pallas).

Cuculus tenebrosus Pallas, Neue. Nord. Beytr. III. 1782. p. 2.

Chelidoptera tenebrosa Berlepsch & Hartert, p. 103.

Eye seal brown; bill black; feet slate color.

¹There was no loose dirt about the entrance to indicate that the cavity was of recent excavation.

Not uncommon. Frequents open glades in forest regions or the less heavily wooded districts bordering open savannas.

The nesting season continues from February to June. The nest is an excavation made by the birds themselves, sometimes in the bank of a stream, after the manner of our Bank Swallow, and again in level ground.

A nest containing two slightly incubated eggs found at Munduapo River, Orinoco, on March 2nd, 1896 (No. 12155 Coll. Geo. K. and Stella M. Cherrie) was situated in the gently sloping bank of the river about ten meters back from the water's edge and about two meters above its surface. The excavation went straight back from the entrance to the nest proper, sloping downward at an angle of 30° with the horizontal, and for a distance of 150 cm. from the entrance. The nest chamber was merely a slight enlargement of the end of the tunnel. There was no nesting material and the eggs lay on the bare sand. The bottom of the nest was 75 cm. from the surface. The parent bird was seen to come from the nest, and during my excavating of the two slightly glossy pure white eggs she remained sitting within easy range on the topmost branch of a tree on the shore. Not a note (that I heard) did she utter or show any special interest in the locality.

A nest containing two eggs, with incubation far advanced was found at Caicara, May 6, 1905. The excavation for this nest was made in nearly level ground at the edge of the open savanna. The burrow extended straight backward and downward at an angle of about 30° with the surface. The nest chamber was about one meter from the entrance and 30 cm. below the surface. A small quantity of short bits of dead grass had been taken in as a nest lining. One of the eggs is short ovate in form, the other ovate. They measured 24×19 and 26×19.5 cm.

A rather remarkable thing about these nests, as in that of *Monasa nigra*, is that the dirt that is excavated is not seen about the mouth of the entrance tunnel.

Near Caicara, on the 8th of May, 1907, I found two nests each with two young birds. Judging from the young found in these two nests, and from those found in other nests examined, I believe that ordinarily one of the two young is born several days before the other. At birth the young are slate black in color, they are entirely naked (without a trace of natal down) and the eyes do not open until about the third or fourth day. When about half grown or a little less, the pin feathers

of the juvenal plumage appear. This plumage is similar to the adult plumage. At about the same time that the pin-feathers begin to appear, the young commence to creep out to the entrance to their burrows, where they sprawl in the sun and await the visits of the parents with food. If alarmed, they will scuttle backwards into the burrow, never turning around to dive in head foremost.

The bottom of the cavities, in nests containing half grown young, are alive with maggots working in the excrement and cast off parts of the insect food—chiefly small beetles—brought to the young.

The two nests referred to above, as found on the 8th of May, were both situated on (or in) the practically level sandy soil of the open savanna. In each, the excavation was in an almost straight line back from the entrance, descending at an angle of about 30° with the horizontal. In one case the entrance tunnel was 200 cm. long and the nest cavity 50 cm. from the surface, in the other the entrance tunnel was 135 cm. long and the nest cavity 35 cm. from the surface.

GALBULIDAE—THE JACAMARS.

Berlepsch and Hartert's paper records five species only, two of which were met with on the Orinoco proper, the other three being recorded from Caura River points. An additional species from the upper Orinoco is now recorded.

I believe that without exception the members of this family are resident wherever found.

KEY TO GENERA, SPECIES AND SUBSPECIES OF GALBULIDÆ

- | | |
|--|--------------------------|
| a. General color above green iridescent | |
| 1. Tail wholly black | <i>Galbula cyanura</i> |
| 2. Under surface of tail feathers | |
| 3. Under surface of tail feathers | <i>Galbula cyanura</i> |
| 4. A broad iridescent green band across the breast | <i>Galbula cyanura</i> |
| 5. With a green band across the breast | <i>Jacamerops cyanus</i> |
| b. Mouth and base of lower mandible, green color of the inside of the bill | |
| 6. General color above iridescent or brownish | <i>Ptilinopus cyanus</i> |
| 7. Throat white, tail long and not graduated | <i>Ptilinopus cyanus</i> |
| 8. Throat brownish, tail not graduated | <i>Ptilinopus cyanus</i> |

UROGALBA DEA (Linn.).

Alcedo dea Linn., Syst. Nat. (1758): p. 116 (Surinam).

In the American Museum are two specimens collected by Miller at Boca de Sina, Cunucunuma River, Upper Orinoco. This species has not before been recorded from the Orinoco.

GALBULA GALBULA (Linnaeus).

Alcedo galbula L., Syst. Nat. ed. 12. 1766. p. 182.

Galbula galbula Berlepsch & Hartert, p. 103.

Not observed by the writer below the falls of Atures but common there, and beyond, where it replaces *G. ruficauda* of the middle Orinoco.

Eye seal brown; bill black; feet olive buff.

GALBULA RUFICAUDA Cuvier.

Galbula ruficauda Cuv., Règn. Anim. I. 1817 p. 420; Berlepsch & Hartert, p. 103.

The native name of this and the species preceding is *Barranquero*. Common, found most abundantly near the borders of heavily timbered regions throughout the territory of the middle Orinoco.

This species nests in holes in the ground usually in the banks of streams. The excavation ordinarily slants slightly upward and is from 25 to 100 cm. in depth. No nesting material is taken into the burrows. From two to four dull white eggs are laid.

Eye dark seal brown; bill black; feet olive yellow, claws black.

PSILOPORNIS ALBIROSTRIS Latham.

Galbula albirostris Lath., Ind. Orn. I. 1790. p. 245; Berlepsch & Hartert, p. 104.

Not observed on the Orinoco. Recorded by Berlepsch and Hartert from La Pricion, La Union and Nicare on the Caura River.

BRACHYGALBA LUGUBRIS (Swainson).

Galbula lugubris Swains., Anim. in Menag. 1838. p. 329.

Brachygalba lugubris Berlepsch & Hartert, p. 104.

Not seen on the Orinoco. Recorded from Nicare and from La Pricion on the Caura River.

JACAMEROPS AUREUS (P. L. S. Müller).

Alcedo aurea Müll., Syst. Nat. Supplement, 1776. p. 94.

Jacameroops aureus Berlepsch & Hartert, p. 104.

Berlepsch and Hartert record two specimens taken by Klages at Suapure on the Caura River.

ALCEDINIDAE—THE KINGFISHERS.

Five species are included in Berlepsch and Hartert's paper, all of which were observed on the Orinoco by the writer. These, like the Jacamars, frequent the same general localities throughout the year.

The native names *Matraquero* and *Martin Pescador* are applied indifferently to any and all kingfishers found in the Orinoco region.

KEY TO THE GENERA, SPECIES AND SUBSPECIES OF ALCEDINIDAE.

- a. Breast and sides, including flanks, chestnut.
- b. Middle of belly and crissum white (the smallest of the American kingfishers) *Chloroceryle aenea aenea*.
- b'. Center of breast and crissum chestnut, nearly uniform with sides.
- c. Very large, wing more than 14 cm; back slate blue, not iridescent. *Megaceryle torquata torquata*.
- c'. Much smaller, wing less than 14 cm; back dark green, iridescent. *Chloroceryle inda*.
- a'. Sides and flanks not chestnut but with a broad chestnut band across the breast in the males.
- c. Inner webs of tail-feathers spotted with white. *Chloroceryle amazona*.
- c'. Inner webs of tail-feathers white for basal half or more. *Chloroceryle americana americana*.

CHLOROCERYLE INDA (Linnaeus).

Alcedo inda L., Syst. Nat. ed. 12. 1766. p. 179.

Ceryle inda Berlepsch & Hartert, p. 104.

Observed at various points on the Orinoco above the mouth of the Apure River. It is recorded from points on the Caura River by Berlepsch and Hartert.

CHLOROCERYLE AENEA AENEA Pallas.

Alcedo (acnea) Pallas, in Vroeg's Cat. Ois., Adumbr., 1764, 1, no. 54 (Surinam).

Ceryle superciliosa Berlepsch & Hartert, p. 104.

Common all along the river; also recorded from points on the Caura River.

Eye seal brown; bill blackish; feet dusky.

MEGACERYLE TORQUATA TORQUATA (Linnaeus).

Alcedo torquata L., Syst. Nat. ed. 12. 1766. p. 180.

Ceryle torquata Berlepsch, Ibis, 1884. p. 435 (Rio Apure); Berlepsch & Hartert, p. 104.

Not observed at Bolivar. Common at Caicara and farther up the river, as far as the first falls, at least.

Eye dark seal brown; bill black, slate color at base of mandible and at basal angle of maxilla; feet dusky plumbeous olive.

In the neighborhood of Caicara there were several barrancas (ravines) whose steep sides afforded nesting places for these kingfishers. At such points they were found most frequently associating in little colonies of four or five pairs. But at a point on the main river (the Orinoco) some eight miles above Caicara, there is a high sand bank facing the river. At this point there is a colony of about one hundred and fifty pairs of these birds. The nest cavity is from one to three metres back from the face of the bluff; the tunnel runs horizontally straight back and is from 8 to 12 cm. in diameter. The breeding season lasts from June to August.

CHLOROCERYLE AMAZONA (Latham).

Alcedo amazona Lath., Ind. Orn. I. 1790. p. 257.

Ceryle americana Berlepsch & Hartert, p. 105.

Eye dark seal brown; bill and feet black.

Not uncommon. Noted at all points visited on the Orinoco and recorded from the Caura.

CHLOROCERYLE AMERICANA AMERICANA (Gmelin).

Alcedo americana Gm., Syst. Nat. I. 1788. p. 451.

Ceryle americana Berlepsch & Hartert, p. 105.

Eye dark seal brown; bill black; feet dusky blackish.

Common at all points visited.

MOMOTIDAE—THE MOTMOTS.

There are only two species known to me from our region. Both were collected on the upper Orinoco beyond the second falls, and were not observed below that point.

MOMOTUS MOMOTA (Linnaeus).

Ramphastos momota, L., Syst. Nat. ed. 12. 1766. p. 152.

Momotus momota Berlepsch & Hartert, p. 105.

Eye vermilion; bill black, smoke grey at base of mandible; feet dark smoke grey.

Rare. One specimen taken on the upper river at Nericagua. Probably not uncommon on the Caura River, as it was collected by both André and Klages, and recorded by Berlepsch and Hartert from Suapure, Nicare and La Pricion.

MOMOTUS IGNOBILIS (Berlepsch).

Momotus brasiliensis ignobilis Berl., Journ. f. Orn. 1889. p. 306.

Momotus ignobilis Berlepsch & Hartert, p. 106.

Rare. An immature male was shot at Mataban above the falls of Maipures.

Eye vermillion; bill black, smoke grey at base of mandible; feet dark smoke grey.

TROGONIDAE—THE TROGONS.

The Trogons are but poorly represented in the Orinoco region, two species only having been observed.

TROGON VIOLACEUS VIOLACEUS Gmelin.

Trogon violaceus Gm., Syst. Nat. I. 1788. p. 404; Berlepsch & Hartert, p. 106.

A single specimen identified by Berlepsch and Hartert (*l. c.*) was collected at Munduapo February 23, 1899.

Eye seal brown; bill above blackish, mandible and cutting edges of maxilla slate grey; feet slate color.

TROGON STRIGILATUS STRIGILATUS Linnaeus.

Trogon strigilatus L. Syst. Nat. ed. 12. 1766. p. 167.

Trogon viridis Berlepsch & Hartert, p. 106.

This species is not uncommon on the upper Orinoco from the falls of Atures onward, and is met with, although rarely, on the middle stretches of the river down as far, at least, as the mouth of the Caura River.

In fresh specimens the eye is seal brown, eye-lids blue-grey; bill whitish horn color; feet slate grey.

PSITTACIDAE—THE MACAWS. PARROTS. PARAQUETS.
ETC.

The Berlepsch and Hartert paper listed seventeen species, twelve of which number were observed and collected on the Orinoco proper by the writer. The remaining five were recorded from points on the Caura River, where André and Klages both made collections. Three additional species are included in the present paper.

KEY TO THE GENERA, SPECIES AND SUBSPECIES OF PSITTACIDÆ.

- a.* Forehead and more or less of the sides of face naked *Cypseloides niger*.
a'. Forehead feathered.
b. Lores and region about eye almost entirely naked (feathers if present arranged in narrow lines).
c. Cheeks (at base of mandible) naked.
d. Lines of feathers extending from the lores below the eyes across the face.
c. Bill black.
f. General color of under parts green *Ara severa*.
f'. General color of under parts yellow *Ara ararauna*.
e'. Maxilla white (except black triangle at base of cutting edge); general color of body red *Ara chloroptera*.
d'. Without lines of feathers extending across the face *Ara macao*.
e'. Cheeks feathered *Diopsittacus hahnii*.
b'. Loral region at least partly feathered.
c. Tail long and much graduated (the central pair of rectrices always longest).
d. Breast with transverse bars or scale-like appearance.
e. Primary coverts red with yellowish tips *Pyrrhura melanura*.
e'. Primary coverts blue like the primaries *Pyrrhura picta picta*.
d'. Breast *without* transverse bars or scale-like appearance.
c. Inner webs of tail feathers (except intermediæ) reddish, and under parts uniform green *Aratinga haemorrhoua*.
e'. Inner webs of tail feathers *not* reddish.
f. Under parts *not* uniform. Lower breast and belly washed with orange ochraceous *Aratinga chrysophrys*.
f'. Under parts uniform green (no orange wash) *Aratinga leucophthalmus*.
c'. Tail *not* long and much graduated.
d. Tips of tail-feathers sharply tapering, not rounded.
e. Nostrils opening in the middle of a naked cere, bill slightly compressed at base.
f. Primary coverts orange red *Brotogeris chrysopterus*.
f'. Primary coverts blue or bluish edged with green.
c. Head black.
g. Head green (paler than back) *Brotogeris devillei*.
e'. Nostrils opening at the base of the cere and bill slightly expanded (not compressed) at base.
f. Axillaries and under wing coverts green, not blue or purple.
g. Inner webs of quills underneath greenish; feet pale brownish *Psittacula modesta modesta*.
g'. Inner webs of quills underneath with tinge of bluish green; feet dusky brownish *Psittacula modesta modesta*.
f'. Axillaries and under wing coverts *not* all green.
g. Rump bright green (brighter than back) *Psittacula gualanensis viridissima*.
d'. Tips of tail-feathers rounded.
c. General color of under-parts from throat to crissum green.
f. Wing with a red or orange red speculum.
g. No red color on the tail, no yellow on the head *Amazona inornata*.
g'. Tail partly red or orange, especially at base.
h. Head partly blue, pileum tinged with blue and lores blue *Amazona amazonica*.
h'. Head without any blue, crown yellow, lores whitish *Amazona ochrocephala*.
f'. Without red or orange red speculum; forehead red, lower back and rump red *Amazona bodini*.
e'. General color of under-parts including throat *not* green.
f. Throat blue or yellow.
g. Entire head, throat and breast blue *Pionus menstruus*.
e'. Entire top of head black, throat yellow *Pionites melanocephala*.
f'. Throat and general color of under-parts reddish purple *Pionus fuscus*.

ARA MACAO (Linnaeus).

Psittacus macao L., Syst. Nat. ed. 10. 1758. p. 96.

Ara macao Berlepsch & Hartert, p. 107.

Native name *Guacamayo*. Not uncommon, but very wary.

Eye straw-yellow; bill above horny white with tip slate and angle at base black, below black, bare skin about head dead flesh white; feet slate blackish.

This species was observed at all points visited from the delta region up, as far as I extended my explorations. Like most, if not all, of the species belonging to this family, its presence in any particular locality depends largely on the ripening of the fruits on which it feeds.

ARA CHILOOPTERA G. R. Gray.¹

Ara chloroptera G. R. Gray, *List Psit. Brit. Mus.* (1859) p. 26.

Native name *Carapaico*. Less frequently seen than the preceding species. An adult male and an adult female were taken at Caicara May 23, 1905, and others taken in 1907. Like the preceding species they usually go in pairs. Not noted on my first expedition to the Orinoco.

ARA ARARAUNA (Linnaeus).

Psittacus Ararauna Linnaeus, *Syst. Nat.*, ed 10; 1758: p. 96 (Brazil).

Ara ararauna Stone, *Proc. Ac. Nat. Sci. Phil.* 1913: p. 196 (Guinipa).

Recorded from Guinipa Village by Stone.

ARA SEVERA (Linnaeus).

Psittacus severus L., *Syst. Nat.* ed. 10. 1758. p. 97.

Ara severa Berlepsch & Hartert, p. 107.

Native name *Maracano*. During the season for ripe mangoes about Caicara, from April to June, this species is abundant, associated in small flocks of from five or six to twenty individuals. At this season they are extremely fat and many are shot for food by the natives.

Eye chrome yellow, bare skin about eye chalk white; bill black; feet blackish slate.

DIOPSITTACA HAHNI (Souancé).

Psittacara hahni Souancé, *Rev. Zool.* 1856. p. 58.

Ara hahni Berlepsch & Hartert, p. 107.

Diopsittaca hahni Ridgway, *Proc. Biol. Coc. Wash.* XXV: 1912: p. 99.

Not observed on the Orinoco. Recorded by Berlepsch and Hartert from Suapure on the Caura River.

¹Why should not this be *Cochlodactyla* Brisson, Omb. IV. 1760: p. 184, pl. XIX: 1.

ARATINGA LEUCOPHTHALMUS (P. L. S. Müller).

Psittacus leucophthalmus P. L. S. Müller, Syst. Nat., Suppl. 1776: p. 75 (Guiana).

Aratinga leucophthalmus Stone, Proc. Ac. Nat. Sci. Phil. 1913: p. 196 (Buelte Triste, Manimo Riv.).

Recorded from the delta country by Stone.

ARATINGA HAEMORRHOA Spix.

Aratinge haemorrhoea Spix, Av. Bras. I. 1824. p. 29. Pl. xiii.

Conurus haemorrhous Berlepsch & Hartert, p. 107.

Abundant about Ciudad Bolivar during April, less common at Caicara. Flocks of from two to thirty or forty were frequenting trees of ripe mangoes.

Eye and eye-lid orange yellow, bare skin about eye yellowish white; maxilla vinaceous cinnamon, slaty at the extreme tip, mandible slate color; feet buffy yellow. There is considerable variation in the color of the bill; in some it is vinaceous cinnamon above with the extreme tip and mandible blackish slate; in others the mandible is whitish horn color, slaty at the tip. Many of these, as in the preceding case, are killed for food.

ARATINGA CHRYSOPHRYS (Swainson).

Conurus chrysophrys Swainson, Two Cent. and a Quart. of Birds (in Anim. in Menag. pt. III: 1838: p. 320, No. 120) (Guiana).

Conurus aeruginosus Berlepsch & Hartert, p. 107.

Native name *Cara-Sucia*. Common.

Eye yellow, bill grey, feet slate grey.

This species associates in large flocks, except for a short time during the breeding season. It is the most abundant parrot found along the Orinoco. Tame, very often seen about the native houses.

Chapman (MS.) has pointed out that the proper name for this bird is as given above.

PYRRHURA MELANURA (Spix).

Aratinga melanurus Spix, Av. Bras. I: (1824) p. 36.

Miller collected a series at Boca de Sina, Cunucunuma River (Upper Orinoco) now in the American Museum collection.

PYRRHURA PICTA PICTA (P. L. S. Müller).

Psittacus pictus Müll., Syst. Nat. Supplement, 1776. p. 75.

Pyrrhura picta Berlepsch & Hartert, p. 108.

Pyrrhura picta picta Hellmayr Novit. Zool. XIV: 1907: 37 (Caura River).

Not noted by the writer, but Klages collected specimens at Suapure and at La Pricion that are recorded by Berlepsch and Hartert and there is a fine series in the American Museum collection from La Union, Caura River.

PSITTACULA MODESTA MODESTA Cabanis.

Psittacula modesta Cab., in Schomb. Reis. Guian. iii. p. 727, 1848 (Brit. Guiana).

Psittacula sclateri Berlepsch & Hartert, p. 108.

Not noted on the Orinoco. Berlepsch and Hartert record a specimen collected by André at La Union on the Caura River.

PSITTACULA GUIANENSIS VIRIDISSIMA Lafresnaye.

Psittacula viridissima Lafresnaye, Rev. Zool. 1848. p. 172 (Caracas).

Psittacula guianensis Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 108.

P. guianensis viridissima Hellmayr, Novit. Zool. XIV. 1907. p. 88 (Orinoco points—Altagracia, Ciudad Bolivar).

Native name *Españolito*. Common, usually associating in flocks of from ten to forty or fifty birds.

Eye dark raw umber; bill greyish white; feet whitish.

A nest of this species was found at Quiribana de Caicara, April 26, 1898. It was at the bottom of a hollow in an old stump, about four metres from the ground. The eggs were about 60 cm. down from opening to the nest cavity. No nesting materials had been used and the eggs rested on the bits of decayed wood at the bottom. The nest had contained seven eggs but two had already hatched and all were at the point of hatching. Both parent birds were seen, but flew away and did not return near the nest until long after I had left the nest tree.

BROTOGERIS CHRYSOPTERUS (Linn.).

Psittacus chrysopterus Linn., Syst. Nat. I: 1766: p. 149.

Two specimens from La Union, Caura River in American Museum collection.

BROTOGERIS DEVILLEI Salvadori.

Brotogerys devillei Salvad., Cat. Birds, Brit. Mus. XX. 1891. p. 259; Berlepsch & Hartert, p. 109.

In the region about the falls of Maipures and beyond, this was a common species. Not noted, however, below the rapids.

AMAZONA INORNATA (Salvadori).

Chrysotis inornata Salvad., Cat. Birds Brit. Mus. XX. 1891. p. 281.

Amazona inornata Berlepsch & Hartert, p. 109.

Native name *Sarambo*. Not common and only observed in the neighborhood of Munduapo on the upper river.

The colors taken from fresh birds are: eye orange yellow, bare skin around the eye pale greyish white; bill, above dusky slate along ridge of culmen and for the apical one third, angle at rictus and base dusky wax yellow, below dusky yellowish grey, skin above the nostrils black; feet plumbeous pea green.

Berlepsch and Hartert record also specimens collected by André at Nicare on the Caura River.

AMAZONA OCHROCEPHALA (Gmelin).

Psittacus ochrocephalus Gm. Syst. Nat. I. 1788. p. 339.

Amazona ochrocephala Berlepsch & Hartert, p. 109.

Common. Native name *Loro Real*.

Iris orange chrome, with an inner ring of dark buff; bill blackish. horny white toward the base; feet dusky slate color.

This is the species most sought after as a cage bird (although almost never caged) by the natives, and there is scarcely a house in the country districts where one or more is not to be seen. Except during the breeding season, parrots of this species associate in large flocks (often two or three hundred birds together), which seem to be made up of pairs of adult birds which keep close to one another, and of immature birds not yet mated. The nesting season begins at the end of March and continues to the end of May.

AMAZONA BODINI (Finsch).

Chrysotis bodini Finsch, P. Z. S. 1873. p. 569. Pl. 49.

Amazona bodini Berlepsch & Hartert, p. 109.

Native name *Tagua* or *Loro goro colorado*. During my first expedition on the Orinoco I found this species abundant along the middle stretches of the river, especially about Altigracia and Caicara. None were seen on the two more recent trips.

Eye orange chrome; bill dusky; feet slate grey.

A great many parrots of this and the preceding species, both of which congregate in great flocks, are killed for their flesh. Except during the breeding season, they are very fat and make a most acceptable addition to one's bill of fare.

The status of this species prior to the series I secured in 1897 and 1898, was in doubt.

AMAZONA AMAZONICA (Linnaeus).

Psittacus amazonicus L., Syst. Nat. ed. 12. 1766. p. 147.

Amazona amazonica Berlepsch & Hartert, p. 110.

Native name *Cotorra*. Rare, one specimen taken at Quiribana de Caicara in April, 1898.

Eye orange yellow; maxilla blackish, mandible yellowish horn color with dusky tip; feet dusky olive plumbeous.

PIONUS FUSCUS (P. L. S. Müller).

Psittacus fuscus Müll., Syst. Nat. Supplement, 1776. p. 78.

Pionus fuscus Berlepsch & Hartert, p. 110.

Not observed on the Orinoco. Berlepsch and Hartert record a specimen that was collected by Klages in the "Mountains west of Suapure" (Caura River).

The American Museum contains a specimen from El Llagual (Caura).

PIONUS MENSTRUUS (Linnaeus).

Psittacus menstruus L., Syst. Nat. ed. 12. 1766. p. 148.

Pionus menstruus Berlepsch & Hartert, p. 110.

Native name *Catañito*. Not uncommon. Observed only on the upper river.

Three young were taken on the 13th of March. The nest was a hole in a tree, a natural cavity, about 6.10 m. from the ground. The cavity was about 60 cm. deep, and no lining or nesting material of any kind had been taken in. The oldest of the three young had the body nearly as large as that of the parent, but almost naked. Judging by the size of the three young, there must have been at least four or five days between the hatching of the oldest and of the youngest.

Adults in life have the eye seal brown, bare skin about eye bluish

slate color; bill blackish above with reddish spot near the basal cutting edge, mandible dusky horn color; feet dusky olive greyish.

Recorded also from Suapure and from Nicare on the Caura River by Berlepsch and Hartert.

PIONITES MELANOCEPHALA (Linnaeus).

Psittacus melanocephalus L., Syst. Nat. ed. 12. 1766. p. 149.

Pionites melanocephala Berlepsch & Hartert, p. 110.

Native name *Calzoncito*. Not common. Observed only on the upper river, about Munduapo and Nericagua.

Eye orange yellow; bill slate color; feet dusky blackish slate.

Collected on the Caura River, also by both André and Klages (Berlepsch and Hartert).

EUCINETUS CAICA (Latham).

Psittacus caicus Latham, Ind. Orn. 1: (1790): p. 128 ("Cayana").

The American Museum collection contains two specimens from La Union, Caura River.

GYPOPSITTA VULTURINA (Kuhl).

Psittacus vulturinus Kuhl, Consp. Psitt. 1820. p. 62.

Gypopsitta vulturina Berlepsch & Hartert, p. 110.

Not observed on the Orinoco.

Berlepsch and Hartert record specimens from Suapure and from La Pricion on the Caura.

CATHARTIDAE—THE AMERICAN VULTURES.

Berlepsch and Hartert list only a single species sent by the writer from Caicara. Field work and a study of the larger series of specimens in this museum, together with material from the American Museum of Natural History and from the U. S. National Museum, has convinced the writer that there are at least two, and possibly a third species of *Cathartes* found along the shores of the Orinoco. I have not had access, however, to sufficient authentic material,—material with reliable data,—to work out the relationship to my own satisfaction. I brought back with me eleven specimens, representing two quite distinct and well marked species, both of which are resident in the region under consideration and are distinguished by the native Venezuelans who call them respectively *Zamuro Oripopo de Cabeza Colorado* and *Zamuro*

Oripopo de Cabeza Amarilla. Of these, the one having the "*Cabeza Colorado*" (red head) is much the more common and is probably the *Enops pernigra* of Sharpe (Cat. Birds Brit. Mus. I, 1874, p. 26). The synonymy of the South American vultures of the genus *Cathartes* is in some confusion and while I have neither the specimens nor the necessary library facilities to elucidate the tangle, I hope by the descriptions and careful field notes that follow to make at least two of the species found in northern South America recognizable. Mr. E. W. Nelson did most excellent service determining the status of *C. burrovianus*¹ and by so doing eliminating it from the South American vultures, at least from those found on the Orinoco where there is a race which it resembles in size but not in other characters.

In life the two forms found on the Orinoco are distinguishable at a glance, one appearing much larger and heavier than the other, although the wing and tail measurements are practically the same, as will be noted in the tables of measurements given under the species, and the head in the case of the larger appearing pink or reddish, while that of the smaller is decidedly yellow.

CATHARTES PERNIGRA (Sharpe).

Enops pernigra Sharpe, Cat. Birds Brit. Mus. I. 1874. p. 26.

Cathartes aura pernigra Berlepsch, Ibis. 1884. p. 437 (Angostura).

Cathartes burrovianus Berlepsch & Hartert, Novit. Zool. IX. 1902. p. 111 (in part).

Native name *Zamuro Oripopo de Cabeza Colorado*.

This, the commoner of the two *Cathartes* seen on the Orinoco, was observed at every point visited from Barrancas in the Delta region to above the falls of Atures and Maipures. Occasionally one or two vultures of this species will be seen feeding on some carcass in company with a crowd of Black Vultures. They are seen only in pairs or singly, and I do not remember ever having seen one perched on the roof of a house, as is the custom with the Black Vultures.

My field notes for an adult male of this species, (No. 10486 Cherrie Collection) taken at Caicara River, Orinoco, March 14, 1898, notes written while the bird was perfectly fresh, and before being skinned, are as follows:

Eye golden brown; bill horn white; bare skin on head and neck pansy

¹Proc. Biol. Soc., Wash. XVIII. 1905, pp. 132-135.

purple, except occiput and back of neck which are primrose yellow, the line between the two colors being abrupt and sharply drawn; feet pansy purple.

There is some slight variation in the shade and intensity of coloring but the above represents the average coloring of the head in this species. There is no appreciable difference in coloring between the male and the female and the table of measurements indicates that they are about equal in size. The plumage is black, in freshly moulted specimens strongly washed with purplish (or steel blue) and greenish bronze, the former predominating. As the feathers grow old they bleach to a brownish shade, lightest along the edges and at tip, but the light colored edges of the feathers never become prominent as in the Turkey Vulture (*C. aura septentrionalis*). Below, on breast and belly, the bronzy greenish sheen is more pronounced. The color of the shafts of the primaries below is white or yellowish white; above it varies from a seal brown to the yellowish white of old ivory, depending entirely on the age of the feather, freshly moulted quills being seal brown. The skin of the head and neck is mostly smooth, being transversely wrinkled on the nape and upper part of back of neck only. The feathering does not ascend further on the back of the neck than it does on the sides—there is no ruff. On the lores there is a patch of short bristly black hairs, four or five springing from each papilla, a few about the auricular orifice and on the side of the face below the eye, while they are sparsely scattered over the throat and under side of the neck. In cabinet skins the tips of the wings rarely reach to the end of the tail. Following is a list of specimens examined, with measurements:

				W	T	Ts
131946	U. S. N. M.	Machapoc Bo	Gurma, Apr., 1892.	495	270	60
131947	"	Araby	" " June, 1891.	495	270	60
♂ 5204 ¹	B. I. M.	Agua Salada de	Apr., 1907, G. K. Cherrie			
		Bolivar, Venez.	14411	520	270	62
♂ 5212	"	Caicara, River Ori-	July, 1907, G. K. Cherrie			
		noco, Venez.	15047	510	260	61
♂ 5216	"	Caicara, River Ori-	June, 1907, G. K. Cherrie			
		noco, Venez.	15075	495	260	58
♀ 5217	"	Caicara, River Ori-	June, 1907, G. K. Cherrie			
		noco, Venez.	14942	495	265	60
♂ 5251	"	Caicara, River Ori-	June, 1905, G. K. Cherrie			
		noco, Venez.	13794	495	280	60

¹Crown patch, nape and back of neck cream yellow.

♀ 5208 B. I. M.	Caicara, River Orinoco, Venez.	June, 1907, G. K. Cherrie	14921	490	200	50
♀ 5209 "	Caicara, River Orinoco, Venez.	Apr., 1907, G. K. Cherrie	14559	493	205	60
♂ 5205 "	Caicara, River Orinoco, Venez.	Apr., 1907, G. K. Cherrie	14539	495	260	60
♂ 5211 "	Caicara, River Orinoco, Venez.	June, 1907, G. K. Cherrie	15000	490	208	60

CATHARTES URUBITINGA Pelzeln.

Cathartes urubitinga Pelz., Sitz. Akad. Wien. XLIV. p. 7 (1861, ex Natt. M. S.); Berlepsch, Ibis. 1884. p. 437 (Angostura).

Cathartes burrovianus Berlepsch & Hartert, Novit. Zool. IX. 1902. p. III (in part).

This, the *Zamuro Oripopo de Cabeza Amarilla* of the Venezuelans along the Orinoco, is much less common than *C. pernigra*. Its habits so far as I have observed are identical with those of the preceding species and the Turkey Vulture of the United States. Below Altigracia on the Orinoco, no specimens were secured and the species was not observed; but Berlepsch (*l. c.*) has recorded a specimen from Ciudad Bolivar ("Angostura") and a specimen from the U. S. National Museum collection, collected at Georgetown, British Guiana, indicates that its distribution includes the hot coast region as well as the interior savanna districts.

The accompanying sketch of the head of the adult female taken at Caicara, River Orinoco, Venezuela, August 9, 1898, (No. 11099 Cherrie Collection²), reproduced from my field notes, will serve to indicate the distribution of color on the head better than any mere written description. The sketch of the head of an adult male (No. 14666 Cherrie Collection) taken at Caicara, May 6, 1907, is also reproduced from my field notes and shows a somewhat different pattern of coloration, but whether the difference shown would be constant in a series I am unable to say.

The plumage is blackish above, heavily washed with purplish steel blue and a dark greenish bronze, more or less iridescent—the greenish bronze shading predominating; below, the general color

¹In old, much worn plumage, the difference in color between the quills freshly moulted and those old and much worn is very striking. The cream-colored crown patch and nape so prominent in other examples is very pale.

²Specimen sent to the Rothschild Museum, Tring, England.

On his departure for South America, Mr. Cherrie left no sketches with the galley proof, so the bulletin must go to press without them. —Ed.

effect is brownish black, but when looked at closely there is seen to be a strong wash of dusky greenish bronze over all. There is no ruff about the neck; the bare part of which is much shorter than in *pernigra* or *aura*, and the feathering extends well up on the back almost to the nape. The character most distinctive about the head is probably the fleshy caruncles sparsely scattered along the sides of the neck and (at least in adults) across the nape. In skins of this species which I have examined, the tips of the folded wings extend beyond the tip of the tail while in *C. pernigra* the tips of the wings rarely reach to the end of the tail. Peizeln's description of this vulture is full and clear and requires no modification except in regard to the color of the shafts of the primaries which are said to be white both above and below ("scapis remigum primariarum supra et subtus albis"); I have found the color of the upper side of the shafts of the primaries to depend entirely on the age of the feather. Freshly moulted primaries have the shaft dark rich seal brown in color, but with exposure this color rapidly fades to an ivory white; in the same way the webs of the primaries become more bronzy brown in hue, the steel blue or purplish sheen of the freshly moulted feathers rapidly fading. The under sides of the shafts of the primaries are white in every stage, but in some of the older quills they become a dirty yellowish white. Only four specimens were available for comparison, the measurements of which are given below.

				W	T	Ts
♂	3750 B. I. M.	San Mateo de Caicara, River Orinoco, Venez.	May, 1905, G. K. Cherrie	480	228	58
"	5207 "	Caicara, River Orinoco, Venez.	May, 1907, G. K. Cherrie	464	218	58
♀	131945 U. S. N. M.	Georgetown, British Guiana,	July, 1891.	474	235	56
	34984 "	Brazil,	Natterer	470	230	56

GYPAGUS PAPA (Linnaeus).

Vultur papa Linn., Syst. Nat., I, p. 86, 1758 (Brazil).

Native name *Rey de Zamuro*. Noted everywhere along the Orinoco and while not common, it could not be classed as rare. Specimens were collected at Caicara.

CATHARISTA URUBU BRASILIENSIS (Bonaparte).

Cathartes brasiliensis Bonap., Consp. Av. I, 1850, p. 59.

Cathartes atratus Berlepsch, Ibis 1884: p. 438 (Angostura).

Native name *Zamuro*. Abundant everywhere, especially about the towns and villages, where, walking about the streets and perched on the house tops, they are characteristic of every landscape.

FALCONIDAE—THE HAWKS.

Eighteen of the twenty-one species recorded in the Berlepsch and Hartert paper were collected by the writer on the Orinoco. The other three species were recorded from points on the Caura River.

POLYBORUS CHERIWAY (Jacquin).

Falco cheriway Jacq., Beitr. 1784. p. 17. Pl. 4.

Polyborus auduboni Berlepsch, Ibis, 1884. p. 437 (Angostura).

Polyborus cheriway Berlepsch & Hartert, p. III.

Native name *Caricari*. Common. There is much variation in the color of the skin on the sides of the head, of the feet and of the bill. An adult female taken at Altigracia, January 31, had the iris cinnamon; bill plumbeous whitish at the tip; bare skin about face pinkish white; feet whitish. A male, taken at Caicara July 4th, had the eye cinnamon; bill plumbeous whitish along the cutting edges; bare skin on face and cere grayish white; feet grayish.

Birds of this species are usually seen in pairs. In company with black vultures, they occasionally feed on carrion, but more frequently they are seen hunting through the grass on the savannas, where they capture small lizards and many insects. I have been told by natives that many snakes are killed and eaten by these birds. They show much intelligence in searching the sandy beaches for eggs of the common river turtle. I have seen on many occasions a pair apparently following on the trail left by a female turtle as she crawled up over the beach in search of a spot where she might deposit her eggs. The birds would often stop and scratch and probe about in the sand with the bill and not infrequently their search was awarded by finding the coveted eggs. Again I have seen a pair stationed by a nest from which young turtles were just emerging to fall victims to the greed of the Caracara. Also I have observed them hanging about a nest of the crocodile where young crocodiles were angrily flopping themselves free from the confining shell and snapping viciously at anything and everything in sight. That the Caracara actually feeds on the young crocodile I cannot say, but that he is present for any disinterested purpose is extremely doubtful.

In the neighborhood of Caicara the Caracara nests in May. The nest is placed in low Guaramal—scrub oak—trees that are found in clusters dotting the savannas.

IBYCTER ATER (Vieillot).

Daptrius ater Vieill., Analyse, 1816. pp. 22, 68.

Ibycter ater Berlepsch & Hartert, p. 111.

Not observed by the writer, but Beebe collected a specimen at Guanoco in the Orinoco delta.

Berlepsch and Hartert record specimens from Temblador and from Nicare (Caura River).

IBYCTER AMERICANUS (Boddaert).

Falco americanus Bodd., Tabl. Pl. Enl. 1783. p. 25.

Ibycter americanus Berlepsch & Hartert, p. 112.

Not uncommon about the rapids of Atures, and at Maipures.

Colors from fresh birds are: eye carmine; bill straw yellow; cere, bare loreal region and sides of lower jaw back as far as the rictus, plumbeous; bare skin around eye, cheeks and throat vermilion; feet vermilion.

MILVAGO CHIMACHIMA (Vieillot).

Polyborus chimachima Vieill., Nouv. Dict. V. 1816. p. 259.

Milvago chimachima Berlepsch, Ibis. 1884. p. 437 (Angostura); Berlepsch & Hartert, p. 112.

Native name "*Chiriquari*" (Chee-ree-quá-ree) or *Garapatera*. Not uncommon. An examination of the stomachs of several indicated that this species feeds largely on beetles and other insects, but is not averse to a diet of small fish (!) and large ticks such as infest cattle are greedily eaten. This hawk is not infrequently seen perched on the backs of cattle.

There is considerable variation in the colors of the fleshy parts about the head, due to age, sex and season. In nuptial plumage the colors seem to be: eye dark mummy brown; bare skin about eye chrome yellow, blending into a sulphur yellow at base of maxilla and mandible; bill very pale blue; feet pea green.

ACCIPITER BICOLOR BICOLOR (Vieillot).

Sparvius bicolor Vieill., Nouv. Dict. X. 1817. p. 325.

Cooperastur bicolor Berlepsch & Hartert, p. 112.

Accipiter bicolor bicolor Hellmayr, Novit. Zool. XIII. 1906. p. 382 (Caicara, Orinoco River).

Not common. Noted at Altagracia, Caicara and Quirbana de Caicara in the thinly wooded savanna regions back from the river. Hawks of this species were usually seen hunting in pairs.

Colors from fresh birds are (adult male taken August 11, 1898): eye orange; bare skin immediately surrounding eye chrome yellow; bill black, slate color at base of mandible; cere, lores and remaining bare skin on sides of face greenish sulphur yellow; feet yellowish olive yellow.

ACCIPITER TINUS (Latham).

Falco tinus Lath., Ind. Orn. I. 1790. p. 50.

Accipiter tinus Berlepsch & Hartert, p. 114 (La Pricion, Caura River).

Not observed on the Orinoco. Berlepsch and Hartert record an immature female collected by André at La Pricion on the Caura River.

RUPORNIS MAGNIROSTRIS (Gmelin).

Falco magnirostris Gm., Syst. Nat. I. 1788. p. 282.

Asturina magnirostris Berlepsch, Ibis. 1884. p. 436 (Riv. Apures).

Rupornis magnirostris Berlepsch & Hartert, p. 112.

While this is the most abundant of the hawks along the middle Orinoco, I did not learn of any vernacular name other than the generic term *Gavilan* (hawk).

Eye deep chrome yellow; bare skin about eye, lemon yellow; bill black, an olive slate color at base; cere orange; feet deep chrome yellow.

A nest with set of two eggs was found at Caicara, May 10th, 1907. The nest was located in the top of a *Chaparo* tree near the border of a large tract of heavy timber. It was in the extreme top of the tree about 6.10 m. from the ground, a bulky structure built up of coarse dry sticks placed between upright forks. Across the top it measured 45.7 cm. in diameter and the depth was 35.5 cm. There was only a slight hollow at the centre of the top where a lining of dry leaves formed a bed for the two eggs. Incubation was far advanced. One egg was accidentally broken in getting down from the tree, the other egg is almost oval in shape and measures 37.5 x 43.5 mm. In color it is white, irregularly blotched with pale ferruginous brownish.

The parent birds were both seen but were wary and did not approach within range.

PARABUTEO UNICINCTUS (Temminck).

Falco unicinctus Temm., Pl. Col. I, pl. 313, 1824 ("Bresil").

Antenor unicinctus Berlepsch, Ibis 1884: p. 436 (Angostura).

Berlepsch (*l. c.*) has recorded a specimen from Angostura (Ciudad Bolivar).

URUBITINGA URUBITINGA (Gmelin).

Falco urubitinga Gm., Syst. Nat. I. 1788. p. 265.

Urubitinga zonura Berlepsch, Ibis 1884. p. 436 (Angostura).

Urubitinga urubitinga Berlepsch & Hartert, p. 113.

Eye seal brown; bill black, slate color at base; cere and at corners of the mouth chrome yellow; lores and bare skin about eye sulphur yellow; feet chrome yellow.

Common, noted at all points visited along the river. On two occasions I caught birds of this species feeding on eggs of the Hoatzin (*Opisthocomus hoazin*).

URUBITINGA ANTHRACINA (Nitzsch).

Falco anthracina Nitzsch, Syst. Pteryl. 1840: p. 83 (Mexico).

Urubitinga anthracina Stone, Proc. Ac. Nat. Sci. Phil. 1913: p. 195, (La Pedrita, Rio Uracoa).

Stone records it from the delta country.

HETEROSPIZIAS MERIDIONALIS (Latham).

Falco meridionalis Lath., Ind. Orn. I. 1790. p. 36.

Heterospizias meridionalis Berlepsch & Hartert, p. 113.

Native name *Pita Venado*. Not uncommon in thinly wooded savanna regions.

Eye golden brown; bill black, blackish at base; cere chrome yellow; feet chrome yellow.

This species is thoroughly detested by the hunter who may be bent on bagging venison, for his game is very frequently startled by the alarm notes of this hawk, which perched on the topmost branch of some tall tree is sure to note the skulking form of the hunter and instantly sound an alarm understood by all the woods people.

TACHYTRIORCHIS ALBICAUDATUS EXIGUUS Chapman.

Tachytriorchis albicaudatus exiguus Chapman, Bull. Am. Nat. Hist. XXXIV: 1915: 637 (Type ex Barrigon, Rio Meta, Colombia).

Chapman records a specimen from Maripa, Venezuela.

BUSARELLUS NIGRICOLLIS (Latham).

Falco nigracollis Lath., Ind. Orn. I. 1790. p. 35.

Busarellus nigracollis Berlepsch & Hartert, p. 113.

Native name *Gavilán Colorado*. Common along the wooded banks of streams and ponds throughout the middle Orinoco region.

Eye seal brown; bill black, blackish slate at base; cere blackish slate; corners of the mouth plumbeous; feet greyish white.

BUTEOGALLUS AEQUINOCTIALIS (Gmelin).

Falco aequinoctialis Gmelin, Syst. Nat., I: 1788: 265 (Cayenne).

Buteogallus aequinoctialis Stone, Proc. Ac. Nat. Sci. Phil. 1913: p. 195 (Pedernales).

Recorded from the delta region by Stone.

ASTURINA NITIDA (Latham).

Falco nitida Lath., Ind. Orn. I. 1790. p. 41.

Asturina nitida Berlepsch & Hartert, p. 113.

Rare, not met with on either my first or second expedition, but a fine adult male was collected at Caicara on April 30, 1907.

Eye vandyke brown; bill black, slate at base of mandible; cere and bare skin about gape chrome yellow; feet chrome yellow; claws black.

Berlepsch and Hartert recorded a single specimen from Suapure on the Caura River.

MICRASTUR BRACHYPTERUS (Temminck).

Falco brachypterus Temm., Rec. Pl. col. tab. 116, 141 (1822).

Micrastur semitorquatus Berlepsch & Hartert, p. 113.

Not common. In 1898 two specimens were taken at Caicara, an adult male in April and an immature female in July. In July, 1907, an adult female was collected at the same point. The stomach in each case contained remains of small lizards.

Colors from fresh birds; eye seal brown; bill black, base of mandible yellowish oil green; feet deep chrome yellow, with an olive wash, especially on the toes.

CIRCUS BUFFONI (Gmelin).

Falco Buffoni Gmelin, Syst. Nat. I: 1788: p. 277 (Cayenne).

Circus buffoni Stone, Proc. Ac. Nat. Sci. Phil. 1913: 194. (La Pedrita, Rio Uracoa).

Recorded from the delta region by Stone.

GERANOSPIZIAS CAERULESCENS (Vieillot).

Sparvius caerulescens Vieill., Nouv. Dict. X. 1817. p. 318.

Geranospizias caerulescens Berlepsch & Hartert, p. 114.

Twice observed at Altagracia; once at Capuchin (nearly opposite the mouth of the Apure River), and once at Caicara. The colors of an immature female taken at Altagracia, November 15, 1897, were: eye chocolate brown with a light outer ring; bill black; cere black; feet bright cadmium orange, claws black. Adult female, Capuchin, August 21, 1898, eye carmine; bill black plumbeous at base of mandible; cere black; feet scarlet vermilion. Colors of the adult male exactly like those in the adult female.

SPIZAETUS ORNATUS (Daudin).

Falco ornatus Daud., Traité d'Orn. II. 1800. p. 77.

Spizaetus ornatus Berlepsch & Hartert, p. 114.

Rare. One was seen on the upper river at Nericagua where it was found in the dense forest bordering the river. The specimen was not at all shy and was finally shot from a dead limb not over fifteen feet from the ground. It proved to be an adult male. The colors from the fresh bird were: eye chrome yellow; bill black, slate grey at base of mandible; lores bluish grey; cere canary yellow; feet bright creamy yellow.

HERPETOTHERES CACHINNANS FULVESCENS Chapman.

Herpetotheres cachinnans fulvenscens Chapman, Bull. Am. Mus. Nat. Hist. XXXIV: 1915: (Type ex Alto Bonito Antioquia, Colombia).

Herpetotheres cachinnans Stone, Proc. Ac. Nat. Sci. Phil. 1913: p. 195 (Pedernales) Orinoco delta.

Chapman records a specimen from the Orinoco delta.

ELANUS LEUCURUS (Vieillot).

Milvus leucurus Vieillot, N. Dict. d'Hist. Nat. XX: 1818: p. 563 (Paraguay).

Elanus leucurus Stone, Proc. Ac. Nat. Sci. Phil., 1913: p. 196 (La Pedrita, Rio Uracoa).

Stone records specimens from the delta region.

LEPTODON UNCINATUS (Temminck).

Falco uncinatus Temm., Pl. Col., 103-105. 1824 (Rio Janeiro).

Rare. Not taken on my first expedition to the Orinoco, but in 1905 an immature female was taken at Caicara June 15th. In 1907

an adult male was taken at the same point in June and a female in July, and a second female (immature) was taken at Las Barrancas in August. In every case the crop was examined and found to be full of the bodies of snails from which the shells had been removed.

Iris primrose yellow; maxilla black, mandible greenish sulphur yellow with distal half of cutting edge slate color; cere parrot green; feet deep chrome yellow.

LEPTODON CAYENNENSIS (Gmelin).

Falco cayennensis Gm., Syst. Nat. I. 1788. p. 263.

Leptodon cayennensis Berlepsch & Hartert, p. 114.

Rare. A single female of this species was taken at Caicara, February 23, 1898, on my first expedition to the Orinoco.

Eye gallstone yellow; bill black; cere deep chrome yellow; feet deep chrome yellow.

ROSTRHAMUS SOCIABILIS (Vieillot).

Herpetotheres sociabilis Vieillot, N. Dict. d'Hist. Nat., XVIII: 1817: 318 (Corrientes and Rio de la Plata).

Rostrhamus sociabilis Stone, Proc. Ac. Nat. Sci. Phil. 1913: p. 195 (Caño Corosal).

The Everglade Kite was observed as far as Ciudad Bolivar. Stone records it from the delta region.

GAMPSONYX SWAINSONI Vigors.

Gampsonyx swainsoni Vig., Zool. Journ. II. 1825. p. 69; Berlepsch & Hartert, p. 114.

Native name *Gavilan primito*. Not uncommon.

This and the succeeding species live in the thinly wooded savanna regions of the middle Orinoco and were not observed beyond the falls of Atures. Specimens were collected at Agua de Salada, Ciudad Bolivar, Altagracia, Caicara and Quiribana de Caicara. They feed chiefly on insects, such as locusts, small lizards, etc., but parts of small birds were found in the stomach of two of those examined.

Eye chestnut; bill black; cere (very inconspicuous) blackish; feet chrome yellow, claws black.

A nest containing two downy young and one egg (pipped) together with the female parent was collected at Agua Salada de

Ciudad Bolivar, April 7, 1907. The nest was about 4.57 m. from the ground at the extreme tip of a horizontal branch of a scrub oak (*Chaparo*) in a thinly wooded savanna region. It was not concealed by foliage either from above or from below. My first impression on seeing the nest was that it was a slightly overgrown nest of a mockingbird (*Mimus*). It is composed entirely of small dry twigs loosely laid together. Outside it measures 12 cm. deep by 20 cm. in diameter across the top. The saucer-shaped nest cavity is 5 cm. deep in the centre, being unusually deep for the nest of a hawk. The outer edges of the nest and the ground beneath it were white with excrement from the incubating birds. The mother bird sat very close and did not leave the nest until I had rapped the tree vigorously.

The single egg which I succeeded in saving, is nearly elliptical, being very slightly smaller at one end than at the other. It is a glossless white, marked about the smaller end with large irregular blotches of chestnut brown. It measures 29.5 x 24.25 mm.

The juvenal plumage (downy young) is white below; above pale vinaceous cinnamon, the wings being darkest and the neck and head palest; there is a small dusty spot above the eye and the loreal region is dusky blackish.

CERCHNEIS SPARVERIUS ISABELLINUS (Swainson).

Falco isabellinus Swains., Anim. in Menag. 1838. p. 281.

Cerchneis sparverius isabellinus Berlepsch, Ibis, 1884. p. 437 (Angostura).

Tinnunculus sparverius isabellinus Berlepsch & Hartert, p. 114.

Not uncommon. Observed at all points visited from Las Barrancas in the delta region up as far as the falls of Maipures.

Eye seal brown; bill black at tip, plumbeous at base; cere orange yellow; feet orange yellow, claws black.

FALCO FUSCO-CAERULESCENS Vieillot.

Falco fusco-caerulescens Vieill., Nouv. Dict. XI. 1817. p. 90.

Hypotriorchis femoralis Berlepsch, Ibis, 1884. p. 437 (Angostura).

Hypotriorchis fuscocaerulescens Berlepsch & Hartert, p. 115.

Not common. Not observed beyond the mouth of the Apure River. Pairs hunt together, apparently aiding one another in the capture of smaller birds. I have seen this species feeding on *Campy-*

Iorhynchus, *Gallinago* and *Thamnophilus*, and have found the stomachs of other specimens full of beetles and other insects; while one examined contained parts of small fish, and another the hair and bones of some small mammal.

A considerable variation was observed in the color of the soft parts. A female taken at Caicara July 4, 1898, had the eye dark seal brown; skin about eye cinereous; bill plumbeous at base, blackish at tip; cere pale pea green; feet Naples yellow. Another female, taken on the same date, had a light seal brown eye; bill blackish at tip changing through slate color to greenish grey at base; cere and skin about eye chrome yellow; feet deep chrome yellow.

FALCO RUFIGULARIS (Daudin).

Falco rufigularis Daud., *Traité d'Orn.* II. 1800. p. 131.

Hypotriorchis rufigularis Berlepsch & Hartert, p. 115.

Rare. Four specimens, two pairs, were taken in the vicinity of the falls of Atures on my first expedition, and an adult male was taken at Caicara, July 4, 1907. In the stomach of the last were found the remains of a Ground Dove, *Chaemopelia*. Berlepsch and Hartert record a specimen from Suapure on the Caura River. Not seen elsewhere.

Eye seal brown; bill slate black, greenish plumbeous at base of mandible; feet chrome yellow, claws black.

FALCO COLUMBARIUS Linnaeus.

Falco columbarius L., *Syst. Nat.* ed. 10. 1758. p. 90.

Hypotriorchis columbarius Berlepsch & Hartert, p. 115.

Two Pigeon Hawks were seen and collected in 1898, an immature female at Altagracia in January, and an adult male at Caicara in March. The stomach of the latter contained parts of a swallow, *Diplochelidon melanoleuca*.

PANDION HALIAETUS CAROLINENSIS (Gmelin).

Falco carolinensis Gm., *Syst. Nat.* I. 1788. p. 263.

Pandion haliaëtus carolinensis Berlepsch & Hartert, p. 115.

The American Osprey is occasionally seen along the Orinoco as far up the river as I explored. A fine adult male was taken at Caicara, March 10, 1898.

STRIGIDAE—THE BARN OWLS.

TYTO PERLATA Lichtenstein.

Strix perlata Licht., Verz. Doubl. p. 59, 1823.

Strix flammea pratincola Berlepsch, Ibis. 1884. p. 435 (Rio Apure).

In 1884 Berlepsch recorded a specimen from "Rio Apure." Not observed by the writer.

BUBONIDAE—THE HORNED OWLS AND THEIR ALLIES.

Only three species are included in the Berlepsch and Hartert paper. Two additional species are added in the present list¹.

SPEOTYTO CUNICULARIA BRACHYPTERA Richmond.

Speotyto brachyptera Richm., Proc. U. S. N. M. XVIII. 1896. p. 663.

Speotyto cunicularia brachyptera Berlepsch & Hartert, p. 116.

Not common, but found everywhere throughout the savanna region.

Eye lemon yellow; bill olive yellow; feet dusky olive.

OTUS CHOLIBUS (Vieillot).

Strix choliba Vieill., Nouv. Dict. VII. 1819. p. 39.

Pisorhina choliba (?subsp.) Berlepsch & Hartert, p. 116.

Not common, but noted at all points visited along the Orinoco.

Eye lemon yellow; bill greyish horn color; feet dusky brownish.

A nest of this species containing a single fresh egg was found at Quiribana de Caicara, April 6, 1898. The nest was a natural hollow in a limb of a scrub oak, about one metre and a half from the ground. No nesting material had been taken into the nest cavity. A second nest similarly placed was found at Agua Salada de Ciudad Bolivar, April 18, 1907. This nest contained a single egg which was taken together with the female parent bird. The egg is white, short ovate in form and measures 35 x 29.5 mm.

RHINOPIYNN CLAMATOR (Vieillot).

Bubo clamator Vieillot, Ois. de l'America Sept. p. 52. Pl. 20. 1807.

This species was noted at various points along the middle Ori-

¹While no specimens were obtained, I feel that a third additional species should be added. Several times at Las Barrancas an owl was observed that I identified as *Pulsatrix psittacilla*.

noco, but only one specimen was collected, an adult male taken at Agua Salada de Ciudad Bolivar, April 10, 1907.

Eye vandyke brown; bill black; feet dusky slate color, claws black.

BUBO VIRGINIANUS SCOTINUS Oberholser.

Bubo virginianus scotinus Oberholser, Sci. Bull. Mus. Bklyn. Inst. I. 1908. p. 371 (Type, ex Caicara, Orinoco River).

Only one specimen. The species was observed at Ciudad Bolivar, Caicara and at Perico.

GLAUCIDIUM BRASILIANUM PHALAENOIDES (Daudin).

Strix phalaenoides Daud., Traité d'Orn. II. 1800. p. 206.

Glaucidium brasilianum phalaenoides Berlepsch & Hartert, p. 116.

Native name *Mochuelo*. Rare. A single specimen of this species was taken at Perico, near the falls of Atures, September 21, 1898.

GLAUCIDIUM JARDINEI (Bonaparte).

Phalaenopsis jardinei Bonap., Compt. Rend., XLI, 1855. p. 654 (Andes of Quito).

Glaucidium jardinii Berlepsch, Ibis 1884. p. 436 (Angostura).

Berlepsch (*l. c.*) has recorded a specimen "in the brown phase" from Angostura (Ciudad Bolivar), Orinoco River.

COLUMBIDAE—THE PIGEONS.

Eleven species were observed on the Orinoco. The majority, at least, are resident wherever found, although the number of individuals of a given species may vary greatly with the season. This is especially true of those forms which feed largely on fruits.

The larger species are much sought after as game birds and while they may be very abundant, they are so exceedingly wary that only the most skillful of hunters succeed in getting a good bag in a day's hunting.

As far as my observations went, none of the species nest in colonies.

Contrary to the rule that pigeons lay two eggs, *Columba rufina* was ascertained to deposit a single egg as a normal clutch.

COLUMBA SPECIOSA Gmelin.

Columba speciosa Gm., Syst. Nat. I. 1788. p. 78; Berlepsch & Hartert, p. 116.

Observed at Maipures, only, during December and January,

where it was not uncommon. The presence of this species in any locality seems to be governed largely, if not entirely, by the ripening of the fruits on which they feed.

Fresh birds have the eye Indian purple, eye-lids burnt carmine; bill poppy-red with the distal one-fourth pearl white; feet heliotrope purple.

Berlepsch and Hartert record a specimen collected by Klages at Suapure on the Caura River.

COLUMBA PURPUREOTINCTA Ridgway

Columba purpureotincta Ridgw., Proc. U. S. N. M., X., p. 594 note, 1887; Berlepsch & Hartert, p. 117.

Common in the savanna regions about Maipures, on the upper river during December. Not observed below the falls of Atures.

Eye heliotrope purple, eye-lids burnt carmine; bill black; feet dark rose-purple.

COLUMBA RUFINA Temminck & Knip.

Columba rufina Temm. & Knip, Fig. I. 1808-11, p. 50. Pl. 24; Berlepsch & Hartert, p. 117.

Native name *Turca*. Common on the upper Orinoco as well as along the middle stretches of the river. This species feeds almost exclusively on fruits; it is chiefly arboreal, frequenting the less heavily wooded regions and borders of the dense forest, and is, excepting during the nesting season, gregarious.

Eye rose red; bill black; feet rose red, claws dusky.

Nests of this species were found in *Moriche* palms and the tangled thickets that grow in and about marshy places, also in the scrub-oaks scattered over the savannas. The nest is a very slight platform of dead twigs located at from two to five metres from the ground. Only one egg is laid. An egg with incubation well advanced, taken at Caicara, June 5th, is white, elliptical ovate in form and measures 39.3 x 26 mm.

ZENAIIDA RUFICAUDA ROBINSONI Ridgway.

Zenaida vinaceorufa Ridgw., Proc. U. S. N. M. VII. 1884. p. 176.

Zenaida ruficauda vinaceorufa Berlepsch & Hartert, p. 118.

Zenaida ruficauda robinsoni Ridgway, Proc. Biol. Soc. Wash. XXVIII 1915: p. 107 (Honda, Colombia).

Common in the savanna regions on the lower Orinoco, but not seen above the first falls. This species feeds both on fruits and seeds, occasionally being seen in flocks with *C. rufina* feeding on fruits in high trees, but usually feeding on the ground in the open savanna.

There are two specimens in the American Museum collection, one from Maripa, Caura River and the other Ciudad Bolivar.

Eye dusky brown; bill black; feet dusky carmine.

A nest found at Caicara June 18, 1907, contained a single fresh egg. The nest was in a low *Moriche* palm about a metre and a half from the ground.

LEPTOTILA VERREAUXI (Bonaparte).

Leptoptila verreauxi Bp., Consp. Av. II. 1864. p. 73.

Leptotila verreauxi Berlepsch & Hartert, p. 118.

Native name *Paloma pipa*; *Paloma rabo blanco*.

Common in the thickly wooded districts, more especially where there is much undergrowth, along the middle stretches of the river; not seen above the falls of Atures.

Eye orange buff, bare skin about eye china blue; bill black; feet lake red.

A nest was found at Quiribana de Caicara April 11, 1898 (No. 10704 Coll. Geo. K. and Stella M. Cherrie). The nest was a slight platform of twigs placed in a thicket about 1.75 m. from the ground. It contained one young bird, nearly ready to fly and an addled egg. The egg was a dirty yellowish white color, ovate in form and measured 28 x 20.8 mm.

This species, I believe, feeds exclusively on the ground.

LEPTOTILA RUFAXILLA RUFAXILLA (Richard & Bernard).

Columba rufaxilla Rich. & Bern., Act. Soc. Hist. Nat. Paris, I. 1792. p. 118.

Leptotila rufaxilla Berlepsch & Hartert, p. 118.

Native name *Paloma pica*.

Found on the upper and lower stretches of the river, but most abundant at and beyond the falls of Atures. It frequents the timbered areas, and feeds chiefly, if not exclusively, on the ground.

Eye olive yellow; bill black; bare skin of lores maroon purple; feet burnt carmine.

LEPTOTILA RUFAXILLA DUBUSI (Bonap.).

Leptotila dubusi Bp., Consp. Av. III: 1854: 74 (Rio Napo, Ecuador).
Leptotila rufaxilla dubusi Chapman, Bull. Am. Mus. Nat. Hist. XXXIV:
1915: p. 370 (Foot of Mt. Duida, upper Orinoco).

I have examined the single specimen (in the Am. Mus. collection), from the foot of Mt. Duida, that has been identified as above by Chapman. It is probable that this race of *rufaxilla* is not found below the great rapids of Atures in the Orinoco.

CHAEMEPELIA PASSERINA GRANATINA Bonaparte.

Chamaepelia granatina Bp., Consp. Av. II. 1854. p. 77.
Columbigallina passerina granatina Berlepsch & Hartert, p. 48.

Native name *Potoquita*; "*Carralera*."

Common throughout the savanna regions. Associates in small flocks, but does not breed in colonies.

Eye rose pink; bill black at tip, Naples yellow at base; feet flesh white.

Nests usually on the ground but occasionally in low trees. A nest was found at Caicara May 20, 1905. It contained two fresh eggs. The nest, a slight affair of slender twigs and grass stems, was on the ground between the rocks on a steep hillside. The eggs are elliptical ovate in form and measure 21.5 x 16 and 23.2 x 15.7 mm.

This and the two succeeding species frequent the open savannas and are exclusively ground feeders.

CHAEMEPELIA RUFIPENNIS RUFIPENNIS (Bonaparte).

Talpacotia rufipennis Bp., Consp. Av. II. 1854. p. 79.
Columbigallina rufipennis Berlepsch & Hartert, p. 119.

Native name *Potoquita colorado*.

Common in the savanna regions.

Adult male, eye orange yellow; bill dusky; feet pale reddish (pink). An adult female had the eye yellowish flesh color, eye-lids lemon yellow; bill black at tip, dusky orange at base; feet pale flesh white.

The nest is on or near the ground and neither the nest nor the eggs of this species are distinguishable from those of *C. p. granatina*.

A nest containing one fresh egg was found at Caicara June 14, 1905. The nest, a slight platform of dead twigs and grass stems, was placed between the stumps of dead leaf stems on the side of a small

Moriche Palm about one metre from the ground. The egg is a short elliptical ovate in form and measures 22.8 x 16.8 mm. The parent bird was shot.

CHAEMEPELIA MINUTA (Linnaeus).

Columba minuta L., Syst. Nat. ed. 12. I. 1766. p. 285.

Columbigallina minuta Berlepsch & Hartert, p. 119.

Specimens of this species taken at Ciudad Bolivar by H. Klages in April, 1898, were recorded by Berlepsch and Hartert. Not seen by the writer.

CLARAVIS PRETIOSA (Ferrari-Perez).

Peristera pretiosa Ferrari-Perez, Proc. U. S. N. M. IX. 1886. p. 175.

Claravis pretiosa Berlepsch & Hartert, p. 119.

Not noted on my first expedition. One specimen, a female, was taken at Caicara, June 14, 1905, and in 1907, it was not uncommon at Caicara.

Specimens taken on the Caura River in December, 1900, by M. André, were recorded by Berlepsch and Hartert.

Birds of this species frequent the borders of thickly wooded areas. They feed, I believe, entirely on the ground.

SCARDAFELLA SQUAMATA RIDGWAYI Robinson & Richmond.

Scardafella ridgwayi Robins. & Richm., Proc. U. S. N. M. XVIII. 1896. p. 660; Berlepsch & Hartert, p. 119.

Native name *Mariquita*. Abundant at Bolivar and Altigracia, much less common at Caicara, and not observed on the upper Orinoco.

Eye clay color; bill blackish; feet flesh color.

This species usually nests on the ground but occasionally nests are found in low trees and bushes, from 1 to 1.5 m. above the ground. I noted nests with fresh eggs from October to June.

A nest containing two eggs taken at Caicara, October 28, 1898, was placed in a thorny palm about 1.5 metres from the ground. It was more substantial and rather more cup-shaped than is usual with the pigeons. The eggs were fresh, pure white, nearly oval in form and measured 21.5 x 16.5 and 21.0 x 17.0 mm.

CRACIDAE¹—CURASSOWS, GUANS, CHACHALACAS.

MITUA TOMENTOSA (Spix).

Crax tomentosa Spix, Av. Bras. II. 1825. p. 49, Pl. 43.

Mitua tomentosa Berlepsch & Hartert, p. 120.

Native name *Pauji culo colorado*. Common along the middle stretches of the river and up as far as the falls of Atures, but replaced on the upper river by *Crax alector*.

Eye bay brown; bill pale horn color at tip, bright vinaceous basally on mandible and at centre of maxilla where the color deepens and darkens rapidly up to the base; ridge of culmen blackish; feet orange rufous.

The *Paujis* are much esteemed as game birds throughout Venezuela—or perhaps I should say as table birds, for some of the qualities esteemed by the sportsman in the game bird are lacking. It is a bird of the thick forest regions, especially of localities where there is a dense undergrowth, and when pursued seeks safety by running, rather than by flight.

A nest, containing two eggs with incubation far advanced, was found at Las Gaucas on the San Feliz River (a tributary of the Cuchivero River), June 2, 1897. The nest was about two metres from the ground, against the stem of a *Corobo* palm at a point where several of the great leaf-stems had been partially broken down and formed a sort of hollowed platform into which leaves from adjoining trees had either fallen, or been carried, and then lined with the narrow green leaflets from the palm itself.

The eggs, which are normally a lusterless, parchment-like white, are much stained (with brown varying in shade from wood brown to cinnamon) from the wet, decaying leaves on which they lay. They are ovate in form and measure 84 x 59 and 84 x 59 mm. The entire egg is thickly covered with small rounded granules, producing an almost sandpaper-like surface.

This set of eggs was collected on the 2nd of June. They were immediately packed and jolted about on the back of a pack-mule for a distance of about seventy-five miles, yet on the 8th of July two young curassows emerged from these eggs and seemed little the worse for

¹In addition to the species observed by the writer and recorded by Berlepsch & Hartert, the following have also been recorded from the Orinoco Region:

Pauxi pauxi (Linnaeus), is recorded from the river Cassiquari and from the Orinoco by Pelzeln, Orn. Bras. (1870), p. 289.

Oriatis ruficauda Jard. is recorded from the Rio Apure and the Rio Orinoco by Berlepsch, Ibis, 1884 p. 440.

the rough handling they had had. The two halves of each of the eggs were carefully put together.

Another set of two eggs found near Caicara June 16th, 1907, was incubated by a common hen for a period of twenty days, when they hatched. These eggs, the parts of which were carefully put together, measure 18×57 and 77×55 mm.

The first pair of chicks lived only eleven days. The second pair were nineteen days old and growing rapidly when, through an accident, they were killed. From the very day when they were born, they evinced a desire for a high perch at night, not seeming to have any fancy for being brooded by their foster mother.

CRAX ALECTOR Linnaeus.

Crax alector L., Syst. Nat. ed. 12. I. 1766. p. 269; Berlepsch & Hartert, p. 120.

Native name *Pauji culo blanco*. Not common. Seen only at Mai-pures and beyond.

PENELOPE JACUPEBA Spix.

Penelope jacupeba Spix, Av. Bras. II. 1823. p. 54, Pl. 71; Berlepsch & Hartert, p. 120.

Birds probably of this species were seen several times about Caicara, but none were taken. The species, however, was taken in February, 1901, on the Caura River by André and recorded by Berlepsch and Hartert.

ORTALIS RUFICAUDA Jardine.

Ortalida ruficauda Jard., Ann. Mag. N. H., XX, p. 374. (1847).

Ortalid ruficauda Berlepsch, Ibis 1884. p. 440 (Rio Apure).

Recorded from Orinoco Region (Rio Apure) by Berlepsch (*l. c.*).

ORTALIS MOTMOT (Linnaeus).

Phasianus motmot L., Syst. Nat. ed. 12. I. 1766. p. 271.

Ortalid motmot Berlepsch & Hartert, p. 120.

Native names *Guacharaca*, *Guacharaca cerro*. Not uncommon on the upper Orinoco and on the San Feliz River, but not observed below the falls of Atures. Berlepsch and Hartert record a specimen from La Pricion on the Caura River.

PIPILE CUMANENSIS (Jacquin).

Crax cumanensis Jacq., Beytr. 1784. p. 25.

Pipile cumanensis Berlepsch & Hartert, p. 121.

Native name *Guacharaca*. Common on the upper river from above the falls of Maipures onward.

Female (No. 11876 Cherrie Coll.)

Eye chestnut brown; bill slate black at tip and pearl blue from anterior point of nostrils and gonys to base, where the color blends with the pale pearl grey of the bare skin on side of the face; feet bright brick red. Chin and upper throat azure blue, the color darkening to slate black on lower part of bare neck and on the wattles.

The nesting season probably begins in February as a female shot February 17, 1899, was laying, as indicated by the active condition of the ovaries.

The *Guacharacas* like the *Paujís* are much sought after by hunters.

TETRAONIDÆ—PARTRIDGE, QUAIL, ETC.

ODONTOPHORUS GUJANENSIS (Gmelin).

Tetrao gujanensis Gm., Syst. Nat. I. 1788. p. 767.

Odontophorus gujanensis Berlepsch & Hartert, p. 121.

Not observed by the writer, but recorded by Berlepsch and Hartert from Suapure on the Caura River.

EUPSYCHORTYX SONNINI (Temminck).

Perdix sonnini Temm., Hist. Nat. Gén. Fig. III. 1815. p. 451.

Euppsychortyx sonnini Berlepsch & Hartert, p. 121.

Native name *Perdiz*. Common everywhere throughout the savanna regions of the lower and middle Orinoco, but not observed above the falls.

OPISTHOCOMIDÆ—THE HOATZIN.

OPISTHOCOMUS HOAZIN (Müller).

Phasianus hoazin Müll., Syst. Nat. Supplement. 1776. p. 125.

Opisthocomus cristatus Berlepsch, Ibis 1884. p. 440 (Angostura).

Opisthocomus hoazin Berlepsch & Hartert, p. 122.

Native names *Guacharaca de Agua*, *Chinchena*. Common along the thickly wooded banks of the Orinoco and its tributaries

from the mouth up almost to the first falls above Perico. It keeps to the tops of the low trees which overhang the water and on the buds and leaves of which it feeds. Colonies occupy the same general area during the entire year, but at the approach of the breeding season, which varies considerably in different localities along the river, the flocks break up into pairs, each pair keeping to a restricted area of the general breeding grounds.

The breeding season about Caicara lasts from early in June until mid September. In 1905 I took the first set of eggs June 11th. Freshly completed nests had been noted as early as May 25th, when I went scouting for them, but at that time they must have been from five to seven metres above the water. The nest found June 11th was between three and four metres above the water at nearly what would be high water mark. On June 18th, seven sets of eggs were collected. With the exception of one set of two, all were fresh.

In my field record for that date I made the following entry: Although Hoatzin are never hunted and very rarely disturbed in their haunts they are nevertheless decidedly shy. Sitting birds would always leave the nest when, or even before, we came in sight of the same. The parent birds never remained near the nests and by actions manifested but little concern in what was going on. Nests are apparently never placed very close together as in a heronry. I have rarely found them nearer than from twenty-five to fifty metres from one another.

Of the seven nests containing eggs found on this date, none were over 1.2 m. above the level of the water. The average was about one meter, although one was only about 45 cm. up. At the rate the river is rising the lowest of these nests would be under water before the week is over.

On June 22nd seven additional sets of eggs were collected. The nests were on an average between 1 to 1.25 m. above the water at that time, which means that they would be at the water level, or below, by the time the eggs would be hatched.

My observations indicate that the nesting season on the Orinoco is controlled to a large degree by the water level in the river. The ovaries of nearly all the Hoatzin collected near Bolivar about the middle of April indicated the approach of the breeding season. Specimens collected at Caicara early in May did not show a more active condition of the ovaries, but as I have stated above, completed nests

were found there May 25th and eggs June 11th. From the 15th to the 25th of June the laying season at Caicara was at its height and the river was rapidly nearing high water mark.

Basing my conclusions on the condition of the ovaries in the birds taken at Bolivar, early in April, I returned to that locality the first week in July, expecting to find young Hoatzin. What was my surprise to find the Bolivar birds nest building—no young; and only one set of eggs taken July 4th. The colony that I had been observing at Bolivar made their home in the thick tangle of tree tops bordering a small lake which occupies a natural basin in an extensive area of low land separated from the river by high rocky embankments. The rapidly rising waters of the Orinoco did not break over this embankment until June 20th. The Hoatzin apparently had not commenced serious nesting until after that date! Did they deliberately await the rising of the water?

The nest of the Hoatzin is a slight platform of dead twigs, loosely put together, out towards the tips of long slender branches, and frequently with but very frail support. Sometimes the nests are almost concealed by surrounding leaves, again they are placed in dead or leafless trees where surrounding foliage does not offer any concealment. If the nest is high enough the eggs usually can be seen from below through the nest walls.

The young Hoatzin is almost naked at birth and a shiny jet black, with olive wash, in color. Within a day or two their eyes are wide open and if a nest be approached without extreme caution it will be found empty. But a little quiet patience will probably reward the collector—at the end of a few minutes the young will be seen making their way from out of the water, into which they had deliberately dropped; along and over the limbs back to the nest. Their locomotion at this time is effected by the aid of the bill, the feet, and the claws that in the young are found on the end of the thumbs and index fingers.

In a series of thirteen sets of eggs, a considerable variation in size, shape, and markings is noticeable. The general shape is ovate, varying from a rather long ovate to short ovate, and occasionally there is an approach toward the oval. (The two eggs of set No. 13898 Cherrie Collection are almost perfectly oval). The general color is a pinkish cream color, varying considerably in shade in the various sets, the markings consist of dots, spots and splashes, scat-

tered all over the surface of the eggs (but more thickly at the larger end) in two series, the outer of a reddish brown color which overlies the inner series which are of a pale lavender color. The average size of a series of 24 eggs was 32.9 x 46.2 mm.

I have found four and five eggs in a set but normally either two or three would seem to constitute a full set, and when more than three are found I suspect it is the result of two females laying in the same nest¹.

TINAMIDAE—THE TINAMOUS.

CRYPTURUS CINEREUS (Gmelin).

Tetrao cinereus Gm., Syst. Nat. I. 1788. p. 768.

Crypturus cinereus Berlepsch & Hartert, p. 122.

Observed and collected only at Maipures, where, while not uncommon, it was rarely seen, because of its exceeding wariness.

CRYPTURUS SOUI SOUI (Hermann).

Tinamus Soui Hermann, Tab. Affin. Anim. (1783): p. 165 (Cayenne).

Tetrao pilcatus Bodd., Tabl. Pl. Enl. 1783. p. 51.

Crypturus pilcatus Berlepsch & Hartert, p. 122.

Native name *Poncha*. This, like the preceding species, is very wary and not often seen. I secured specimens at Nericagua only. The natives assured me that neither species of *Poncha* was found below the falls of Atures.

Berlepsch and Hartert record this species from La Pricion on the Caura River.

CRYPTURUS VARIEGATUS (Gmelin).

Tetrao variegatus Gm., Syst. Nat. I. 1788. p. 768.

Crypturus variegatus Berlepsch & Hartert, p. 122.

Recorded by Berlepsch and Hartert from La Pricion on the Caura River. Not observed by the writer.

PLATALEIDAE—THE SPOONBILLS.

AJAIA AJAJA (Linnaeus).

Platalca Ajaja Linnaeus, Syst. Nat. Ed. XII: 1766: 237.

Common in the delta region and noted as far as the mouth of the Rio Apure.

¹In the MUSEUM NEWS (Brooklyn Institute of Arts and Sciences), IV, 1901, pp. 53-54, I have published a more general and extended account of the Houtz.

IBIDIDAE—THE IBISES.

THERISTICUS CAUDATUS (Boddaert).

Scolopax caudatus Bodd., Tabl. Pl. Enl. 1783. p. 57.

Theristicus caudatus Berlepsch & Hartert, p. 122.

Native name *Tautaco*. Found throughout the savanna region on the lower and middle stretches of the river, but nowhere common. Feeds along the borders of ponds and marshes and in the open savannas. An adult male taken at Caicara May 4, 1905, had the colors of fleshy parts as follows: eye scarlet; bill black; bare skin about the base of the bill around the eye and on the throat black; feet geranium pink.

HARPIPRION CAYENNENSIS (Gmelin).

Tantalus cayennensis Gm., Syst. Nat. I. 1788. p. 652.

Harpiprion cayennensis Berlepsch & Hartert, p. 123.

Not common. Specimens were secured at Altagracia, Caicara, and Quiribana de Caicara, all on the middle Orinoco.

Colors in fresh birds are: eye dark Indian purple; bill pea green at tip, darkening to a bottle green at base; bare skin about eye and on chin and throat indigo blue; feet malachite green.

Berlepsch and Hartert record a specimen from Cangrejo on the Caura River.

PHIMOSUS BERLEPSCHI Hellmayr.

Phimosus berlepschi Hellmayr, Verh. Zool. bot. Ges. Wien. LIII. 1903. p. 247, ex Orinoco River, Altagracia, Caicara).

Phimosus nudifrons Berlepsch & Hartert, p. 123.

Native name *Coro-coro*. The name is also applied to *Harpiprion cayennensis*. Common along the middle stretches of the Orinoco (not noted above the falls), frequenting the banks of streams and ponds.

Eye carmine; bill, in immature, wood brown, blackish at tip; in adults, reddish liver brown; feet dark sepia brown.

CERCIBIS OXYCERCA (Spix).

Ibis oxycercus Spix, Av. Bras. II. 1825. p. 69, Pl. 87.

Cercibis oxycerca Berlepsch & Hartert, p. 124.

Native name *Taro-taro*. Common; frequenting marshy places on the open savanna and the banks of ponds and streams.

Adult male, eye vandyke brown; bare skin about eye lake red; bill hazel brown; bare skin on throat Chinese orange, feet burnt carmine.

GUARA RUBRA (Linnaeus).

Tantalus ruber L., Syst. Nat. ed. 12. I. 1766. p. 241.

Eudocimus ruber Berlepsch & Hartert, p. 124.

Native name *Coro-coro Colorado*. Abundant in the delta region, but comparatively rare along the middle Orinoco, and not observed beyond the falls.

ARDEIDAE—THE HERONS.

The Orinoco, first in the delta region, with its enormous areas of swamp and woodland, and then in the vast thinly wooded savannas that border the middle stretches of the river and its tributaries (especially the Apure) with their numberless shallow ponds and marshes heavily bordered with tangled forest growth, furnishes ideal conditions for herons and other species of similar habits, and is indeed the home of myriads of these birds.

While the number of species of herons found is not large—only thirteen—the number of individuals is probably as great or greater than that of any other group.

ARDEA COCOI Linnaeus.

Ardea cocoi L., Syst. Nat. ed. 12. I. 1766. p. 237; Berlepsch, Ibis, 1884. p. 438 (*Angostura*); Berlepsch & Hartert, p. 124.

Native name *Garza morena*. Common along the lower and middle stretches of the Orinoco and its tributaries. It is one of the characteristic birds of the Orinoco where its habit of perching high up on the branches of the tall trees on the river bank, where it is afforded an unobstructed view in all directions, makes it a conspicuous object in the landscape. Exceedingly wary, it takes flight at the approach of a canoe long ere the hunter is within range. The natives hunt them for food but for my own part I do not consider the meat a delicacy.

Adult male, eye bright straw yellow; bill rather bright Gladstone yellow, blackish slate at base of maxilla (from middle of nostrils posteriorly) and a narrow dusky streak along the basal cutting edge of the mandible; extreme base of mandible and bare skin about eye bottle green; feet black. The blackish slate and Gladstone yellow on the maxilla blend into one another very gradually.

EGRETTA CANDIDISSIMA (Gmelin).

Ardea candidissima Gm., Syst. Nat., I, 1789, p. 633.

Ardea candidissima Berlepsch, Ibis, 1884, p. 438 (Angostura).

Native names *Garza blanco pequina*; Egret; Osprey; *Garza de pluma*. Abundant, and like its larger relative *H. egretta*, more widely distributed during the rainy season than during the dry season.

HERODIAS EGRETTA (Gmelin).

Ardea egretta Gm., Syst. Nat. I. 1788, p. 629.

Herodias egretta Berlepsch & Hartert, p. 124.

Native name *Garza blanco grande*. Abundant. During the rainy season this species has the entire vast savanna region as a feeding ground and at that time is widely distributed over the open savannas; but, as the savannas become dry and parched with the advance of the dry season, the flocks of egrets are driven closer and closer together near the banks of streams and ponds in their search for suitable feeding grounds.

Eye straw yellow; bill dark chrome yellow; bare skin about base of bill and eye citron yellow; feet black.

FLORIDA CAERULEA CAERULEA (Linnaeus).

Ardea caerulea L., Syst. Nat. ed. 10. I. 1758, p. 143.

Florida caerulea Berlepsch & Hartert, p. 124.

Not common. Specimens collected only at Caicara, but noted also at Ciudad Bolivar, Atagracia and Quiribana de Caicara. Klages took a specimen at Mato River which is recorded by Berlepsch and Hartert.

AGAMIA AGAMI (Gmelin).

Ardea agami Gm., Syst. Nat. I. 1788, p. 629.

Agamia agami Berlepsch & Hartert, p. 125.

Rare. An immature male (recorded by Berlepsch and Hartert) was taken at Quiribana de Caicara, in the belt of heavy timber bordering Quiribana Creek, April 4, 1898; and an adult male, near the same point May 1, 1907. The colors on the latter bird were:

Eye ochraceous rufus; bill black above, dusky grey with greenish wash below; feet slate black anteriorly, dusky pea green posteriorly.

The colors of the immature male taken at Quiribana de Caicara

were: eye, orange ochraceous with the posterior quarter section of the iris seal brown; maxilla black, mandible dusky olive brown; feet and legs blackish slate for the anterior half and dusky sage green behind.

NYCTICORAX NYCTICORAX NAEVIUS (Boddaert).

Ardea naevia Bodd., Tabl. Pl. Enl. 1783. p. 56.

Nycticorax gardeni Berlepsch, Ibis, 1884. p. 439 (Angostura).

Nycticorax nycticorax naevius Berlepsch & Hartert, p. 125.

Common, frequenting the timbered belts bordering the Orinoco and the small streams tributary thereto.

NYCTANASSA VIOLACEA (Linnaeus).

Ardea violacea Linnaeus, Syst. Nat. Ed. X: 1758: p. 143 (Carolina).

Nyctanassa violacea Stone, Proc. Phil. Ac. Nat. Sci. 1913: p. 193 (Corosal).

Stone has recorded a specimen from the delta region.

COCHLEARIIUS COCHLEARIIUS Linnaeus.

Cancroma cochlearia L., Syst. Nat. ed. 12. I. 1766. p. 237; Berlepsch & Hartert, p. 125.

Common about Ciudad Bolivar and up at least as far as Caicara and Quiribana de Caicara, frequenting the wooded banks of the small creeks flowing into the Orinoco.

Fresh birds have the eye dusky; maxilla black, mandible dusky sulphur yellow, blackish at tip; bare skin of chin and throat sulphur yellow; feet oil green.

PILHERODIUS PILEATUS (Boddaert).

Ardea pilcata Bodd., Tabl. Pl. Enl. 1783. p. 54.

Pilherodius pilcatus Berlepsch & Hartert, p. 125.

Not common. Observed at Ciudad Bolivar, Altagracia, Caicara and Quiribana de Caicara.

The colors taken from a freshly killed adult male were: eye, olive brown; bill, horny pearl grey at tip, changing gradually into plumbeous which blends gradually into the cobalt blue of the basal two-thirds of the maxilla, and abruptly into the lilac colored central part of the mandible; basal part of mandible and bare skin about face cobalt blue; feet cinereous.

SYRIGMA SIBILATRIX (Temminck).

Ardea sibilatrix Temm., Pl. Col. V. 1824. p. 271; Berlepsch, Ibis, 1884. p. 438 (Rio Apure).

Syrigma sibilatrix Berlepsch & Hartert, p. 126.

Native name *Garza Carricia*. Not common. Adult male and female; eye pearl grey; bill rose pink, blackish at the tip; feet black. At the point of union between the blackish tip and rose pink body of the bill there is a short space of whitish fading into the two adjoining colors abruptly, while between the rose pink and azure blue of the maxilla there is a narrow band of cobalt blue into which the two adjoining colors merge abruptly.

This, the Snowy Egret, and other species of herons, are often seen about the native houses, sometimes tied with a string about one leg, but more frequently they are at liberty within the *patios*, the wing having been amputated at the wrist to prevent their flying away.

BUTORIDES STRIATA (Linnaeus).

Ardea striata L., Syst. Nat. ed. 10 I. 1758. p. 144.

Butorides cyanurus Berlepsch, Ibis, 1884. p. 439 (Angostura; Rio Apure).

Butorides striata Berlepsch & Hartert, p. 126.

Native name *Chicuaco*. Not common, or at least rarely seen. I noted it at Bolivar, and at other points on the river as far up as the falls of Atures.

Colors taken from a freshly killed adult female were: eye lemon yellow, bare skin about eye sulphur yellow; bill black above, pale dusky greenish below; lores black; feet olive green.

Two nests were found in the tree tops on a submerged island in the Orinoco near Caicara July 18, 1907. One contained two, the other three eggs. In the two eggs incubation was far advanced; in the set of three it had just begun. The nests were each slight platforms of dry sticks. The nest containing the three eggs was only about 15 cm. above the water, and, as the river was rising rapidly, would have been under water before the next morning! The other nest was about one metre above the water.

The eggs are ovate approaching elliptical in form, and pale greenish greyish Nile blue in color. The set of three measure 28 x 38; 28.25 x 38 and 28.25 x 37 mm.

TIGRISOMA LINEATUM (Boddaert).

Ardea lineata Bodd., Tabl. Pl. Enl. 1783. p. 52.

Tigrisoma brasiliense Berlepsch, Ibis, 1884. p. 439 (Rio Apure).

Tigrisoma lineatum Berlepsch & Hartert, p. 126.

Native name *Pajaro Baca*. Common, frequenting the thickly wooded banks of small streams flowing into the Orinoco. In life adults have the iris bicolored, the inner part being chrome yellow which blends rather abruptly into a walnut brown on the outer half; bill clove brown along the ridge of the culmen, merging into a mummy brown along the sides, bare skin on chin, throat and around eye sulphur yellow; bare skin at base of mandible citron yellow; gonys horny straw yellow; feet olive in front and olive green on the posterior half.

ZEBRILUS PUMILUS (Boddaert).

Ardea pumila Boddaert, Tabl. Pl. Enl. 1783: p. 54.

Rare. Not taken or seen on my first expedition to the Orinoco. The fresh colors of an adult male taken at Agua Salada de Ciudad Bolivar, April 11, 1905, were: Eye straw yellow; bill dusky above, pale yellowish horn color below; feet anteriorly olive greenish, brighter lemon yellowish posteriorly. A single specimen was seen in the thickets forming the breeding ground of the Hoatzin at Caicarita, Caicara, July 18, 1907.

PALAMEDEIDAE—THE SCREAMERS.

Only one of the species of Screamers has been noted on the Orinoco.

PALAMEDEA CORNUTA Linnaeus.

Palamedea cornuta Linnaeus, Syst. Nat., Ed. XII: 1766: p. 232 (Brazil, Guiana).

Anhima cornuta Stone, Proc. Ac. Nat. Sci. Phil., 1913: p. 194 (Manimo Riv.).

I found the Horned Screamer abundant at Las Barancas, and Stone reported it very common on the Manimo River.

PHALACROCORACIDAE—ANHINGAS, CORMORANTS, ETC.

ANHINGA ANHINGA (Linnaeus).

Plotus anHINGA L., Syst. Nat. ed. 12. I. 1766. p. 218; Berlepsch & Hartert, p. 127.

Native name *Cotúa* and *Agujita*; also sometimes applied to the Cormorant, *P. vigua*. Common on the lower and middle stretches of the river but not observed above the falls.

PHALACROCORAX VIGUA (Vieillot).

Hydrocorax vigua Vieill., Nouv. Dict. VIII. 1817. p. 90.

Phalacrocorax vigua Berlepsch & Hartert, p. 127.

Native names *Cotua*, *Cotua Zamura*, *Cotua Nigro*.

Abundant all along the river, at least as far as the falls of Atures.

RALLIDAE—THE RAILS.

PORZANA ALBICOLLIS (Vieillot).

Rallus albicollis Vieill., Nouv. Dict. XXVIII. 1819. p. 561.

Porzana albicollis Berlepsch & Hartert, p. 127.

Rare. A single specimen was taken in the marsh bordering the brook at Quiribana de Caicara in April, 1898.

Colors taken from the freshly killed bird were: eye bright vandyke brown; upper half of maxilla olive green, lower half of maxilla and entire mandible apple green; feet dusky brown.

ARAMIDES CAJANEA (Müller).

Fulica cajanea Müll., Syst. Nat. Supplement, 1776. p. 119.

Aramides cayennensis Berlepsch, Ibis. 1884. p. 440 (*Angostura*).

Aramides cajanea Berlepsch & Hartert, p. 128.

This species was abundant in the thick tangles of vines and bushes bordering small streams and ponds, and was noted at all points visited along the Orinoco. In the early morning their loud strange call notes could be heard on every side. They are extremely wary and the gunner must be alert if he catches one as it darts across some narrow path before him. The meat is delicious.

In an adult female the eye was ochraceous rufous, eyelids scarlet; bill apple green; feet burnt carmine.

ARAMIDAE—THE LIMPKINS OR COURLANS.

ARAMUS SCOLOPACEUS (Gmelin).

Ardea scolopacea Gm., Syst. Nat. I. 1788. p. 647.

Aramus scolopaceus Berlepsch, Ibis, 1884. p. 440. (Angostura). Berlepsch & Hartert, p. 128.

Native name *Carrao*. Not common and only observed at Altagracia and Caicara, where it seemed to keep to the thickly wooded borders of the ponds adjacent to the main river.

EURYPYGIDAE—THE SUN BITTERNS.

EURYPYGA HELIAS (Pallas).

Ardea helias Pall., Neue Nord. Beytr. II. 1781. p. 48, Pl. 3.

Eurypyga helias Berlepsch, Ibis, 1884. p. 440 (Angostura); Berlepsch & Hartert, p. 128.

Native name *Tigana*. Not uncommon along the thickly wooded banks of ponds and streams where it keeps on or near the ground. The *Tigana* is often seen in a semi-domesticated state in the native houses where they are esteemed for the number of spiders and insects they destroy.

PSOPHIIDAE—THE TRUMPETERS.

PSOPHIA CREPITANS Linnaeus.

Psophia crepitans L., Syst. Nat. ed. 10. I. 1758. p. 154; Berlepsch & Hartert, p. 128.

Abundant in the delta region. Noted repeatedly at Las Barrancas, and Beebe secured specimens at Guanoco. Berlepsch and Hartert record specimens collected by Klages at Suapure on the Caura River.

OEDICNEMIDAE—THE STONE PLOVERS OR THICK-KNEES.

OEDICNEMUS BISTRIATUS (Wagler).

Charadrius bistriatus Wagl., Isis, 1829. p. 648.

Oedicnemus bistriatus Berlepsch, Ibis, 1884. p. 44 (Angostura); Berlepsch & Hartert, p. 128.

Native name *Alcaravàn Negro*.

Not uncommon. Found on the open savannas only. Usually seen in pairs.

Eye lemon yellow; bill black, yellowish olive buff at base of mandible; feet olive yellow.

CICONIIDAE—JABIRU; STORKS; WOOD IBIS.

EUXENURA MAGUARI (Gmelin).

Ardea maguari Gmel., Syst. Nat., I, 1789, p. 623 (Brazil).

Although no specimens were collected this species was seen sufficiently near to make identification certain. It was noted at Las Barrancas, Altagracia, San Mateo de Caicara and at Las Guacas and La Cascabel on the San Feliz River.

JABIRU MYCTERIA (Lichtenstein).

Ciconia mycteria Licht., Abh. K. Akad. Wiss. Berlin (Phys. Kl.), for 1816-17, 1819, 163 (Brazil).

Native name *Garzon Soldado*.

Widely distributed throughout the Orinoco Region from the delta up as far, at least, as the mouth of the Meta River. Specimens were collected at Las Guacas and La Cascabel on the San Feliz River (near its union with the Cuchivero River), and it was observed at Las Barrancas, Altagracia, San Mateo de Caicara, Quiribana de Caicara and near the mouth of the Meta River.

MYCTERIA AMERICANA Linnaeus.

Mycteria americana Linn., Syst. Nat., ed. 10, I, 1758, 140.

Tantalus loculator Berlepsch, Ibis, 1884, p. 437 (Angostura).

Noted all along the Orinoco up as far as the falls of Atures.

JACANIDAE—THE JACANAS.

JACANA JACANA Linnaeus.

Parra jacana L., Syst. Nat. ed. 12. I. 1766. p. 259, part; Berlepsch, Ibis, 1884, p. 440 (Angostura); Berlepsch & Hartert, p. 129.

Native name *Gallineto de Laguna*.

Common. Frequents the banks of ponds and streams and open marshes.

Adult female: eyes slate grey; bill ochre yellow; shield maroon purple; feet dusky olive grey.

CHARADRIIDAE—PLOVERS, SANDPIPERS, ETC.

Eight species were collected on my first expedition and recorded by Berlepsch and Hartert. Twelve are included in the present list, and there is little doubt that at least as many more will be discovered when the delta region will have been carefully worked over.

HOPLOXYPTERUS CAYANUS (Latham).

Charadrius cayanus Lath., Ind. Orn. II. 1790. p. 749.

Hoploxypterus cayanus Berlepsch & Hartert, p. 129.

Native name *Alcaravancito*. Common along the shores of streams and ponds. This species does not associate in flocks and rarely more than two or three are seen together. It was noted at all points visited.

Eye seal brown, eye-lids scarlet; bill black; feet scarlet.

BELONOPTERUS CAYENNENSIS (Gmelin).

Parra cayennensis Gm., Syst. Nat. I. 1788. p. 706.

Vanellus cayennensis Berlepsch, Ibis, 1884. p. 441 (Angostura).

Belonopterus cayennensis Berlepsch & Hartert, p. 129.

Native name *Alcaravana de corbata*; *Alcaravan*.

Common on the open savannas. Usually seen in pairs. On the middle Orinoco the nesting season begins in April.

This lapwing is thoroughly detested by the native deer hunters from the habit it has of following, often for long distances, any one it may see walking about among the little clumps of trees and bushes that here and there dot the savannas, and screaming its displeasure. The deer seem to understand that cry and are instantly on the alert.

Eye red lake, eye-lids and chin lilac; bill black at tip, lilac at base; feet Indian purple.

ÆGIALITIS SEMIPALMATA (Bonaparte).

Charadrius semipalmatus Bonap., Journ. Acad. N. S. Phila., V, 1825, p. 98 (Coast of New Jersey).

Found in the delta region from October to April.

ÆGIALITIS COLLARIS (Vieillot).

Charadrius collaris Vieill., Nouv. Dict. XXVII. 1818. p. 136.

Ægialitis collaris Berlepsch & Hartert, p. 129.

A not uncommon resident species usually. Solitary or seen in pairs on the sand beaches along the river during the dry season and on the open savannas during the wet season.

Eye seal brown; bill black; feet flesh color.

HIMANTOPUS MEXICANUS (Müller).

Charadrius mexicanus Müll., Syst. Nat. Suppl., 1776, p. 117 (Mexico).

Abundant about the great marshes near Las Guacos on the San Feliz River (Terrenos dell Tigre) during May, 1907.

NUMENIUS HUDSONICUS Latham.

Numenius hudsonicus Lath., Index Orn. II, 1790, p. 712 (Hudson Bay).

This species was noted at Altigracia in November, 1897, but no specimens were secured.

HELODROMAS SOLITARIUS (Wilson).

Tringa solitaria Wils., Am. Orn. VII. 1813. p. 58, Pl. 58, fig. 3.

Helodromas solitarius Berlepsch & Hartert, p. 129.

Occasionally met with from early in August until the first of February. Observed at Las Barrancas, Agua Salada de Ciudad Bolívar. Ciudad Bolívar, Altigracia, Caicara. Berlepsch and Hartert record a specimen also from Suapure on the Caura River.

TOTANUS FLAVIPES (Gmelin).

Scolopax flavipes Gm., Syst. Nat. I. 1788. p. 659.

Totanus flavipes Berlepsch & Hartert, p. 130.

Small flocks were seen about Altigracia from the last of December until February.

TOTANUS MELANOLEUCUS (Gmelin).

Scolopax melanoleucus Gm., Syst. Nat. I. 1788. p. 659.

Totanus melanoleucus Berlepsch, Ibis, 1884. p. 441 (Angostura); Berlepsch & Hartert, p. 130.

Small flocks of Greater Yellow-legs were seen at Altigracia several times during the month of November, 1897.

ACTITIS MACULARIA (Linnaeus).

Tringa macularia L., Syst. Nat. ed. 12. I. 1766. p. 249.

Tringoides macularia Berlepsch & Hartert, p. 130.

The Spotted Sandpiper is to be seen along the Orinoco from early in September until the first of April. Berlepsch and Hartert record it also from the Caura River.

PISOBIA FUSCICOLLIS (Vieillot).

Tringa fuscicollis Vieill., Nouv. Dict. d'Hist. Nat. XXXIV, 1819, p. 461 (Paraguay).

Common at Las Guacos, San Feliz River during May, 1907.

GALLINAGO PARAGUAIAE (Vieillot).

Scolopax paraguaiae Vieill., Nouv. Dict. III. 1816. p. 356.

Gallinago paraguaiae Berlepsch & Hartert, p. 130.

Native name *Cogelas todas*. Not uncommon along the marshy borders of small streams that cross the savannas, and widely distributed over the savannas themselves during the rainy season. The species was noted at all points visited along the river.

GALLINAGO BRASILIENSIS (Swainson).

Scolopax Brasiliensis Swainson, Faun. Boreal. Am. 1831: p. 400 (Brazil).

Gallinago brasiliensis Stone, Proc. Ac. Nat. Sci. Phil. 1913: p. 192. (Orinoco delta, Caño Corosal).

Stone records specimens from Caño Corosal (Orinoco delta country).

ANATIDAE—DUCKS, GEESE, ETC.

CAIRINA MOSCHATA (L.).

Anas moschata L., Syst. Nat. ed. 10. 1758. p. 124.

Cairina moschata Berlepsch & Hartert, p. 131.

Native names *Pato real*; *Pato negro*. Common.

Eye seal brown; bill black; bare skin about face black, the caruncles at base of bill and about face black at their base, pale scarlet at their free ends; feet black.

The *Pato real* when not feeding spends much of its time in the large trees bordering streams. During the rainy season it feeds almost entirely on the open savannas but as the dry season advances it is driven more to the wooded banks of ponds and streams. It is exceedingly wary and the native hunter considers himself fortunate to bag a *pato negro*. They may be often seen completely domesticated and breeding about the native houses.

Five ducklings, an entire brood, three or four days old, were taken at Las Barrancas, San Feliz River, May 30, 1907.

DENDROCYGNA DISCOLOR Sclater & Salvin.

Dendrocygna discolor Scl. & Salv., Nomencl. Av. Neotr. 1873. pp. 129, 161; Berlepsch & Hartert, p. 131.

Native name *Güiriri*. Abundant. This and the following species, *Alopochen jubatus*, are the most common ducks found on the Orinoco.

ALOPOCHEN JUBATUS (Spix).

Anser jubatus Spix, Av. Bras. II. 1825. p. 84. Pl. 108.

Alopochen jubatus Berlepsch & Hartert, p. 131.

Native name *Carretero*. Abundant along the banks of the Orinoco and its tributaries.

Eye seal brown; bill black reddish at angle of commissure; feet vermilion.

This is the most abundant species of "Duck" in the Orinoco region. Like the *Pato real*, it is frequently seen in a state of semi-domestication about the native houses, but I do not know of its breeding.

The males at the beginning of the mating season—December and January—fight some terrific battles, and where a large flock is assembled, in some marshy spot near the river, the noise of battle may be heard for a long distance. The blows of the wings against one another and the constant loud guttural "honking" of the contending birds make a deafening racket. The females feed quietly, apparently not taking much interest in the fray.

This species like the Tree Duck (*D. discolor*) nests in hollow trees.

NETTION BRASILIENSE (Gmelin).

Anas brasiliensis Gm., Syst. Nat. I. 1788. p. 517.

Nettion brasiliense Berlepsch & Hartert, p. 131.

Native name *Pato Azulijo*. Not common at points visited on the Orinoco proper, but abundant about the marshes in the vicinity of Las Guacas, San Feliz River, during May, 1907.

On the Orinoco this species was noted at Bolivar, Altagracia, Caicara and Quiribana de Caicara.

LARIDAE—GULLS, TERNS, ETC.

PHAETHUSA CHLOROPODA (Vieillot).

Sterna chloropoda Vieillot, N. Dict. d'Hist. Nat. XXXII: 1818: 171 (Paraguay).

Phaethusa magnirostris Berlepsch & Hartert, p. 132.

Native name *Guanaguanare*.

Eye seal brown; bill canary yellow, lightest at the base; feet sulphur yellow.

One of the most abundant and characteristic of birds along the Orinoco. It is likely to be the first species one will see on entering the mouth of the great river, and as he proceeds towards the head-waters it will follow him, and even when he crosses through the Cassiquiare and down the Rio Negro to the Amazon.

The nesting season begins in December and lasts until February.

STERNA SUPERCILARIS Vieillot.

Sterna superciliaris Vieill., Nouv. Dict. XXXII. 1819. p. 126; Berlepsch & Hartert, p. 132.

Native name *Tenten*. Not abundant but observed everywhere both on the lower and upper stretches of the river. Fresh birds have the eye seal brown; bill dark Naples yellow; feet dusky sulphur yellow.

RYNCHOPS NIGRA CINERASCENS (Spix).

Rhynchops cinerascens Spix, Av. Bras. II. 1825. p. 80, Pl. 102.

Rhynchops nigra cinerascens Berlepsch & Hartert, p. 132.

Native name *Gaviota*. Common all along the middle and lower stretches of the river.

LARUS ATRICILLA (Linnaeus).

Larus atricilla Linn., Syst. Nat. I, 1758, p. 136 (Bahamas).

Often seen in company with the Large-billed Tern (*Phaethusa chloropoda*) about the mouths of the Orinoco and common at almost all points along the shore of the Bay of Paria.



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